PB90-114638

Superfund Record of Decision (EPA Region 5)
Galesburg/Koppers, IL. (First Remedial Action)
June 1989

(U.S.) Environmental Protection Agency, Washington, DC

6 Jun 89

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-89/090
June 1989

PB90-114638

EPA

Superfund Record of Decision:

Galesburg/Koppers, IL

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SPRINGFIELD, VA. 22161

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-89/090	2.	3. Recipient's Accession No. PB 90 114638 /AS
4. Title and Subtitle SUPERFUND RECORD OF DECISION Galesburg/Koppers, IL First Remedial Action - Final			5. Report Date 06/30/89 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Galesburg/Koppers site is a 105-acre area located approximately two miles south of the city of Galesburg in Knox County, Illinois. The land surrounding the site is sparsely populated with the Burlington Northern Railroad yard to the north, a landfill to the east, and four residences and a lumber yard to the south and west. Farmland abuts these areas. Burlington Northern Railroad Company operated the site as a railroad tie treating plant from 1907 to December 1966. In 1966 the Koppers Company, Inc. leased the production plant from Burlington Northern and resumed operation of the facility. Treatment operations consisted of pressure treatment of the railroad ties using a mixture of creosote and coal tar or creosote and fuel oil. From 1971 to 1976 pentachlorophenol (PCP) was used in the treatment process. Key contaminated areas at the site include a slurry pond, a northern and southern creosote lagoon, a PCP-contaminated lagoon, a waste pile storage area, two backfilled drainage ditches, and two former spray wastewater fields. Contamination has been found in soil, ground water, surface water, and on- and offsite sediment. This Record of Decision (ROD) addresses all contaminated media. These actions, in combination with remedial actions at the Steagall Landfill site, are intended to eliminate offsite surface water and
(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision - Galesburg/Koppers, IL
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: organics (PAHs, PCP, phenols)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 91
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

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Firest Remedial Action - Final

16. Abstract (continued)

sediment contamination as well. The primary contaminants of concern affecting the soil and ground water are organics including PCP, phenols, and PAHs.

The selected remedial action for this site includes excavation and onsite consolidation of approximately 15,200 yd^3 of contaminated soil with onsite biological treatment of soil and implementation of a biological monitoring program; construction of shallow ground water interceptor trenches and deep pumping wells with pumping and onsite pretreatment of shallow and deep ground water using an existing wastewater treatment system to achieve cleanup objectives, discharging treated ground water to a publicly-owned treatment works (POTW) for final treatment or onsite treatment should the POTW pretreatment standards not be achieved; ground water monitoring; and implemention of access and land use restrictions. The estimated present worth cost for this remedial action is $4,286,844, which includes an estimated annual O&M of $170,012.

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DECLARATION FOR THE RECORD OF DECISION (ROD)

SITE NAME AND LOCATION

Koppers Wood-Treating Facility
Galesburg, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected final remedial action for the Koppers Wood-Treating Facility site in Galesburg, Illinois, developed in accordance with the Illinois Environmental Protection Act, Ill. Rev. Stat. 1983, ch. 111 1/2, pars. 1001 et. seq., CERCLA, as amended by SARA, and the National Contingency Plan (NCP) to the maximum extent practicable. This decision is based on the administrative record for this site. The attached index (Appendix C) identifies the items that comprise the administrative record upon which the selection of this final remedial action is based.

The U.S. Environmental Protection Agency (USEPA), Region V supports the selected remedy for the Koppers/Galesburg site.

DESCRIPTION OF SELECTED REMEDY

The final remedy at the Kopper's Wood-Treating Facility in Galesburg, Illinois consists of the following:

- Excavation of visibly contaminated soils plus a six-inch buffer layer to a depth that ensures effective mitigation of groundwater contamination from "hotspots" identified on-site (north creosote lagoon, drip track, northeast portion of pentachlorophenol (PCP) lagoon and area east of the retort building), samples will be taken to assess these mitigative efforts and to confirm final remediation to health-based levels; backfilling of excavated areas with "clean" soil, regrading of the "area of contamination" for positive surface drainage; revegetation and maintenance of the affected areas.

- Conduct an on-site field scale biological treatment demonstration study with a biological monitoring program. Upon successful demonstration of technology, consolidation of excavated contaminated soils into a full scale cell through a phased loading approach. Upon treatment of the final lift of contaminated soil, implementation and maintenance of management measures as necessary.

- Construction and operation of a system of shallow interceptor trenches and deeper pumping wells to contain and extract contaminated groundwater from the site. Extraction will continue until established in-situ groundwater clean-up objectives are met. Extracted groundwater will be pretreated in the existing wood-treating facility wastewater system as necessary prior to conveyance to the Galesburg Sanitary District publically owned treatment works (POTW) for final treatment. Treated groundwater will meet established clean-up objectives for surface water discharge prior to

release by the POTW. Maintenance of the groundwater remedial system; development and implementation of contingency plans for alternative on-site treatment should the POTW be unable to accept site wastewater in the future.

- Monitoring of groundwater within, and at the perimeter, of the "area of contamination" to assess the effectiveness of the groundwater remedy; development and implementation of contingency plans for collection of contaminated groundwater as necessary. Direct monitoring of extracted and pretreated groundwater prior to release to the POTW for quality compliance purposes.

- Application and enforcement of access and land use restrictions for the "area of contamination" in accordance with the terms of the anticipated Consent Decree with the responsible parties (RPs).

DECLARATION

It is the considered opinion of the State of Illinois, through the Illinois Environmental Protection Agency (IEPA), following consultation with USEPA Region V, that the selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action (or invokes an appropriate waiver), and is cost-effective. This remedy is consistent with the State Contingency Plan. This remedy satisfies the federal statutory preference of CERCLA/SARA for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted by IEPA, in consultation with USEPA, within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Bernard P. Killian

Bernard P. Killian, Director
Illinois Environmental Protection Agency

6/28/89
Date

DECLARATION STATEMENT
RECORD OF DECISION

RECEIVED
JUL 11 1989
IEPA/DLPC

SITE NAME AND LOCATION

Koppers Wood-Treating Facility
Galesburg, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document serves as United States Environmental Protection Agency (U.S. EPA) concurrence with and adoption of the remedial action decision for the Koppers site, as approved by the Illinois Environmental Protection Agency (IEPA), and pursuant to sections 104(d) and 117 of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). IEPA approved this remedial action in conformance with: Illinois Environmental Protection Act; and it has provided U.S. EPA with documentation to demonstrate the State's selection of the remedy conforms with the requirements of the CERCLA, as amended by Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan, to the extent practicable.

The State has undertaken response action at the Koppers Facility and has sought U.S. EPA concurrence in adoption of the remedy which has been selected. The U.S. EPA concurrence with the State's selected remedy is based upon the items listed in the attachment and the adequacy and completeness of those documents as represented by the State.

DESCRIPTION OF REMEDIAL ACTION

The selected remedy provides for final cleanup requirements related to the Koppers site, as provided below:

* Excavation of visibly contaminated soils with a six-inch buffer layer to a depth that will ensure effective migration of ground water contamination. Samples will be taken to confirm final remediation to health-based levels.

* Extraction and treatment of shallow and deep ground water until ground water clean-up objectives are based.

* Discharge of treated ground water to the Galesburg POTW that are consistent with pretreatment standards and/or surface water.

* Monitoring of ground water and bioremediation treatment.

* Application of access and land use restrictions for the "area of contamination".

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies that statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site, the State is expected to supply information such that the U.S. EPA can conduct a review no less than five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and environment.

Based on the information described above, U.S. EPA adopts and concurs with the decision the IEPA has made in the exercise of the States authority in selecting this remedy under an agreement between U.S. EPA and IEPA pursuant to section 104(d) of CERCLA for implementaion of the remedy, attached hereto.

June 30th, 1989
Date

Valdas V. Adamkus
Regional Administrator

Attachment

V

KOPPERS WOOD-TREATING FACILITY
GALESBURG, ILLINOIS SITE

RECORD OF DECISION (ROD) SUMMARY

JUNE 27, 1989

KOPPERS WOOD-TREATING FACILITY
GALESBURG, ILLINOIS SITE

DECISION SUMMARY INDEX

I. Site Name, Location and Description

II. Site History and Enforcement Activities

III. Community Relations

IV. Scope and Role of Operable Unit or Response Action

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VI. Summary of Site Risks

VII. Documentation of Significant Changes

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IX. Summary of Comparative Analysis of Alternatives

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XI. Statutory Determinations

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Appendix B - Responsiveness Summary
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KOPPERS WOOD-TREATING FACILITY
GALESBURG, ILLINOIS SITE
DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

Site Description

The Koppers Company, Inc. (Koppers) Galesburg Wood-Treating Facility site is located approximately 2 miles south of the City of Galesburg, Knox County, Illinois. The location and vicinity maps of the Koppers/Galesburg site are shown in Figures 1 and 2, Appendix A, respectively. The Koppers site occupies an area of approximately 105 acres. The active tie treating area uses approximately 2 acres, with a large portion of the site devoted to railroad tie storage.

The Koppers railroad tie treating facility is located on land owned by the Burlington Northern Railroad Company (BN), at the southern end of the BN railroad yard complex. Operational facilities and waste treatment/disposal areas are shown in Figure 3. Current operations include: the treatment cylinder building and drip track (A&S); the office building (B); storage tanks for creosote (D); water (E); wastewater (F and W); the storage yard for untreated ties (G); and the wastewater treatment system. Wastewater is piped to a tank where it is held prior to discharge to the flocculation basin. From the flocculation basin, the wastewater passes through the oil/water separator to the activated sludge treatment unit. The wastewater is discharged from this unit directly to the Galesburg Sanitary District publicly owned treatment works (POTW).

Southeast of the Koppers site is the Steagall Landfill. This site is also located on BN property and has been included on the Illinois State Remedial Action Priority List (SRAPL). See Figure 3. Figure 4 gives additional information on the land use of the surrounding area.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site History

The railroad tie treating plant, built in 1907, was operated by BN until December, 1966. At that time, Koppers leased the production plant from BN and took over operation of the facility. The treating operation consists of pressure treatment of railroad ties in treating cylinders utilizing a 70:30 mixture of creosote and coal tar. Previously, a 50:50 blend of creosote and no. 6 fuel oil was used. During the period of 1971 to 1976, one of the three treating cylinders was converted to pentachlorophenol (PCP) use.

The key areas associated with past waste disposal practices are also shown in Figure 3. These areas include the "BN slurry pond" (also known as the old creosote lagoon) (J); the north (M) and south (L) creosote lagoons; the PCP lagoon (I); the waste pile storage area (T) which has been consolidated in the north creosote lagoon area; two drainage ditches that have been backfilled and

regraded, the interceptor ditch (R) and the Koppers ditch (P); and two former spray wastewater fields (H) & (N). The operation history of the plant's waste disposal areas is summarized in Table 1.

The Koppers/Galesburg site was announced for inclusion on United States National Priority List (NPL) in December 1982. The Illinois Environmental Protection Agency (IEPA) accepted lead responsibilities for conduct of a Remedial Investigation/Feasibility Study (RI/FS), with support from the United States Environmental Protection Agency (U.S. EPA). Negotiations were carried out with Koppers, and Burlington Northern, throughout 1984 and 1985 toward an agreement to allow them the opportunity to voluntarily undertake an appropriate RI/FS. On March 19, 1985, Koppers and BN entered into a Consent Decree with the State (Docket Number 83-CH-92). Following Work Plan development, the RI work took place from May, 1985, through April, 1986. The final report documenting the findings of the RI was issued on August 8, 1986. A public meeting was held in April, 1987, to discuss this information. Additional field work has been conducted since that time to further characterize the site, which should also decrease the forthcoming remedial design period. Supplemental data on groundwater, surface water and sediment contamination off-site has been provided by the RI conducted by IEPA for the adjacent Steagall Landfill.

The public comment FS findings were released on May 22, 1989, as was the Agency's proposed plan. A public comment period was initiated that day and concluded on June 12, 1989. A Special Notice Letter and draft RD/RA Consent Decree will be sent to Koppers and Burlington Northern in early July, 1989, beginning the moratorium period on Remedial Design/Remedial Action (RD/RA) settlement discussions. Formal negotiation meetings will then take place between Koppers, BN, IEPA, and the Illinois Attorney General's Office (IOAG), with technical support from USEPA.

III. COMMUNITY RELATIONS

The IEPA has been responsible for conducting a community relations program for the site. Interviews with neighbors, concerned citizens and community leaders indicated a community-wide consensus that environmental contamination attributed to Koppers, as well as the adjacent Steagall Landfill site needed to be investigated. The community relations program emphasized:

a. Initial visits with site neighbors and community leaders,

b. Establishment of a local repository of documents,

c. Assistance to news media in Illinois to inform the public of ongoing activities and the results of the investigation.

Milestone activities conducted by Community Relations staff during the RI/FS included:

* Interviews with neighbors near the site and with community leaders,

* Establishment of a repository of public documents at the Galesburg Public Library,

* Development of a mailing list of site neighbors, interested citizens and organizations, news media, and elected officials in local, county and state government.

* Fact sheets #1 explaining the results of the Remedial Investigation,

* Paid newspaper advertisements announcing the RI public meetings and FS public hearings,

* A public meeting in February 1988 to meet concerned citizens and discuss results of remedial investigation. Approximately 50 people attended the meeting,

* Fact sheet #2 explaining the results of the feasibility study and setting forth the proposed plan in accordance with CERCLA Section 117,

* Public hearings on feasibility study and proposed plan in May and June 1989. Approximately 20 people attended each of the hearings.

A responsiveness summary addressing comments and questions received during the public comment period on the RI/FS and proposed plan is attached as Appendix B.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

This is the first and only "operable unit" (or response action) at the site and addresses all affected media: soils, sediments, air, groundwater, surface water, and fish.

V. SITE CHARACTERISTICS

The Remedial Investigation characterized the nature and extent of actual and/or potential contamination associated with the site. The following activities were accomplished as part of the RI, and post RI work:

- Review of existing data
- Geophysical survey
- Soil sampling
- Nested groundwater monitoring well installation(s) and sampling of wells; 2 sampling events each with continued monitoring of a baseline network
- Surface water and sediment sampling
- Lime sludge sampling
- Air monitoring
- Steagall Landfill data evaluation
- Private well survey and sampling
- Fish sampling in Lake Bracken and Lake Storey (background)
- Bench scale bioremediation study
- Hydrogeologic analyses to assess the capabilities of interceptor trenches to collect the plume in the shallow till aquifer and pumps to capture the plume in the deep sand aquifer.

General conclusions about the site and contamination assessment are presented below:

Site Conditions

- The site consists of unconsolidated glacial materials. Surficial materials at the site consist of poorly-drained silty clay soils and fill materials. Glacial till underlies surficial soils and its average thickness is 33 feet. The till is an aquitard. The second hydrogeologic unit is a semiconfined aquifer directly beneath the till aquitard. This aquifer is composed of sand with an average thickness of 17 feet, and is used locally as a water supply domestically and for livestock. Underlying the sand unit is bedrock which is predominantly shale and siltstone.

- Major surface water features in the vicinity of the site are Brush Creek and Cedar Creek. The site lies on a divide between the Illinois River and Mississippi River watersheds.

- Brush Creek is an intermittent stream on the eastern edge of the Burlington Northern property. It flows to the southeast; from the southeastern corner of the site it is approximately 2 miles to Lake Bracken. Cedar Creek flows to the southwest through the City of Galesburg and it receives drainage from the extreme west side of the site via an intermittent tributary. The remaining majority of site drainage enters the Brush Creek watershed.

- Groundwater flow within the confined deep sand aquifer is predominantly toward the south.

- A shallow groundwater divide in the till (aquitard) is present near the center of the site. This divide is oriented east-northeast from the office building parking lot to the northeast corner of the treatment building area. Groundwater in the shallow till aquifer north of the divide flows to the north and east and; groundwater south of the divide flows to the southeast.

- The deep sand aquifer is recharged from upgradient areas at a higher evaluation. Additional recharge occurs by infiltration from the shallow till aquifer because vertical gradients between the shallow till and deep sand aquifers are consistently downward over the site.

Waste Conditions

Results of the RI performed at the Koppers site indicate that contamination exists in soil, groundwater, surface water, and sediment onsite and sediments in Brush Creek off-site. Six classes of compounds are identified as critical contaminants. They are dioxins and furans, carcinogenic polynuclear aromatic hydrocarbons (PNAs), noncarcinogenic PNAs, phenols, pentachlorophenol (PCP), and naphthalene. The general nature and extent of contamination is as follows; a summary of indicator chemical concentrations and distribution over the site is provided in Table 8 of Appendix A.

Soil

- Soil contamination containing observable concentrations of organic contaminants (phenols, PNAs and PCP is evident in the following areas) and from the surface to the following depths (unless otherwise noted):

- South and east of the treatment building, greater than 20 feet below the surface.

- Drip track area, greater than 20 feet below the surface.

- Pentachlorophenol (PCP) lagoon bottom, 3-8.5 feet below the bottom of the lagoon.

- Area immediately north and east of the PCP lagoon.

- 9.5-11.3 feet below the bottom of the BN slurry pond. 18-24 feet below the ground surface in the north and south creosote lagoon areas.

- 10.5-35.5 feet below the ground surface in the BN trestle area.

- Lime sludge is present in the old spray field soils to a depth of 1.5 to 3.0 feet.

- Analytical results indicate the greatest degree of phenols and total PNA contamination occurs in the main drip track area; area east of the treatment (retort) building; in the north creosote lagoon area, and to a lesser extent in the south creosote lagoon and the BN trestle area. The greatest degree of pentachlorophenol is in the bottom of the PCP lagoon. PCP is also present in the creosote lagoons and BN trestle area, but to a lesser extent.

- Limited concentrations of furans and dioxins were detected in a sample from the PCP lagoon bottom.

Groundwater

- Groundwater contamination is present in the shallow till aquifer and the deep sand aquifer. Figures 5 and 6 indicate current areas of groundwater contamination in the respective aquifers.

- The distribution of contamination in the shallow aquifer is consistent with groundwater flow characteristics. "Elevated" (part per million) levels of phenols, PCP, and total PNAs are present along the north side of the treatment building and downgradient of the drip track and former PCP handling areas. Directly downgradient of the PCP lagoon there are elevated concentrations of pentachlorophenol and PNAs. The north and south creosote lagoons are source areas of high contamination of phenols, PNAs, and to a lesser extent, PCP, that have migrated downgradient to the south and east of these areas. Phenols and pentachlorophenol have migrated to a greater extent than have the PNAs.

- Groundwater contamination in the deep sand aquifer, north of the PCP lagoon and downgradient of the former creosote lagoons, is present in "trace" (part per billion) levels beneath contaminated areas in the shallow till aquifer. This is apparently the result of vertical migration from the overlying till under the influence of downward vertical gradients.

Surface Water, Sediments and Fish

Contamination is present in drainageways leading from the site. This contamination is indicated by detectable concentrations of PNAs in surface water and sediment samples from several drainageway locations on-site. The data collected as part of the Steagall RI shows detectable levels of PNAs in Brush Creek sediment along its length from the outfall of site drainage to Lake Bracken. Fish samples (bottom-feeders) collected in 1987 from Lake Bracken showed detectable levels of PNAs, while fish samples collected from Lake Bracken in 1988 did not. Further off-site study is anticipated through supplemental Steagall Landfill work.

Air

The air samples collected during the RI indicate "low" ambient air contamination on-site. Additional air monitoring will be conducted during Remedial Design/Remedial Action to evaluate the necessity for mitigative measures during construction to prevent adverse impacts to workers and the public. Phenol was found in the on-site air only at the existing spray field. The highest concentration of total PNAs in quantitative air monitoring samples was in the active drip track areas immediately adjacent to the tie treatment facility. PNAs were also present in the ambient air around the treatment building, existing spray field and PCP lagoon, all on the eastern portion of the site.

VI. SUMMARY OF SITE RISKS

At the conclusion of the RI, an Endangerment Assessment (EA) was performed to define the actual or potential threat from site-related contaminants to human health and the environment. The results of this assessment indicate that the greatest threat to human health and the environment under the "no action" scenario occurs via the groundwater pathway. The no action scenario assumes that no remedial action will take place. The groundwater pathway includes actual and potential migration of hazardous contaminants from the shallow aquifer to the deep sand aquifer and subsequent transport downgradient to nearby residential wells. The estimated total excess incremental cancer risk due to consumption of drinking water from the nearest existing well, in the absence of remedial activities, is between 2.12×10^{-4} and 4.77×10^{-4}. The total hazard index (measure of noncarcinogenic risk) for the nearest well is estimated to be 0.292, with an upper bound of 62.6.

Other transport pathways that were evaluated in the EA include volatilization and/or dispersion of hazardous constituents in soil to ambient air. Ambient air monitoring, including influence from the active facility, revealed detectable levels of PNAs. The nearest resident downwind is approximately 0.3 miles from the property line. In the assessment, a worse case scenario was used where a residence was established near the property line. The estimated overall excess cancer risk level associated with exposure is 1.5×10^{-5}. The data used in this assessment was not taken under ideal air monitoring conditions, and therefore, additional future air monitoring will be implemented during remedial design/remedial action primarily for health and safety purposes.

The State superfund Steagall Landfill RI included surface water and sediment sampling in Brush Creek, it tributaries through the landfill, and Lake Bracken. The analyses of these surface water samples did not reveal detectable concentrations of the Koppers' contaminants of interest. Sediment contamination of Koppers' site-specific and "landfill-type" contaminants has been confirmed through additional sampling by the State and the RPs. An on-site remedial action is currently in the bid procurement stage for the landfill project. In addition, on February 9, 1989, the IEPA signed a State ROD for a focused RI/FS of the Brush Creek and the sediment deposition area of Lake Bracken in order to determine necessary action to remediate contaminated sediments and prevent additional effects from the upstream sites. These actions, in combination with implementation of an on-site Koppers remedy, will conceptually eliminate further contamination of Brush Creek. The supplemental focused study of Brush Creek and Lake Bracken is currently being negotiated between the RPs and the State.

Scenarios that were evaluated qualitatively by the RPs and found not to represent a significant risk include: exposure of "workers" to contaminated soil and air, exposure of "visitors" to contaminated soil, exposure through consumption of potentially contaminated food crops grown off-site and exposure of wildlife to contaminated soil and water. Rationale for elimination of these exposure pathways is as follows. Workers follow plant/OSHA and health safety procedures to prevent usafe occupational exposures. These measures were assumed to be protective against incidental exposure to "CERCLA site" contaminants. Further, the locations of "CERCLA site" contaminants are in abandoned areas on the eastern portion of the site not routinely used by workers. This site is located in a rural industrial/agricultural area. It is fenced with a locking gate at the main entrance. This, in combination with on-site industrial activity (also in BN yard to north) and heavy rail traffic to the east and south, severely limits "non-worker trespassing" and, to a leaser extent, wildlife use. (Note: access/use restrictions are proposed as part of the remedial action plans detailed further into this decision summary to facilitate elimination of existing and/or potential direct contact exposure risks.) Finally, contamination of food crops off-site with potentially contaminated groundwater was dismissed from consideration because of the lack of irrigation practices for this region.

Exposure scenarios that were selected for quantitative analysis in the EA and EA Addenda include: persons swimming in Brush Creek or Lake Bracken, persons consuming fish from Lake Bracken, and fish and aquatic life in Lake Bracken. These scenarios were found not to present a significant human health or environmental risk by the RPs, given the existing data base. However, supplemental Steagall Landfill study data collected in 1987 lead IEPA to issue a fish consumption and upper lake/creek wading "warning". A fish advisory was recently issued for carp and catfish in Lake Bracken based on observed PCB levels, not PNAs which are the primary contaminant of concern at the Koppers site. Additional study of fish in Lake Bracken should be included in the supplemental "off-site" study previously mentioned.

On May 10, 1989, the Agency for Toxic Substances and Disease Registry (ATSDR) completed a Health Assessment (HA) of the Koppers NPL site. The HA focused on the public health implications resulting from exposure to five major classes

of contaminants present together at the Koppers and adjacent Steagall Landfill site: (1) PAHs (or PNAs); (2) phenolic compounds; (3) dioxins/dibenzofurans; (4) polychlorinated biphenyls (PCBs); (5) other contaminants (i.e. asbestos, PCP, and vinyl chloride). ATSDR concludes the following which is an assessment of the data from both the Koppers and Steagall Landfill sites:

> "This site is a public health concern because of the risk to human health resulting from probable exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section [of the ATSDR health assessment], human exposure to PAHs and PCBs is probably occurring and has probably occurred in the past via ingestion of PAH and PCB-contaminated aquatic organisms (e.g., fish) and dermal contact with contaminated sediments. On-site contamination of soil, surface water and groundwater with PAHs, phenolic compounds, metals and asbestos at this site is evident. There is also evidence of off-site groundwater contamination (i.e., PNAs, phenols, metals) at levels of concern to public health. The information reviewed indicates that migration of contamination to off-site soil, at levels of concern to public health, has not occurred. Consumption of potentially contaminated plants and game and/or livestock is also of possible concern to human health, if contaminated surface water is used for the irrigation of plants and the watering of domestic animals. Remediation of the site is necessary to minimize potential exposure from on-site and off-site contamination."

ATSDR will determine at a later time if follow-up public health actions or studies are appropriate for this site.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

The remedial alternative preferred by the Agency remains unchanged from that proposed to the public during the comment period. It is biological soil treatment in combination with BAT groundwater treatment and access/land use restrictions (Alternative 2 - FS addendum report for public comment, Mathes, May, 1989). The details of this alternative will be expanded upon in subsequent sections of this decision summary. No significant changes have therefore been identified at this time.

VIII. DESCRIPTION OF ALTERNATIVES

The feasibility study process identifies, screens, then develops remedial alternatives to effectively mitigate existing and/or potential human health and environmental threats posed by the site.

Due to existing manufacturing activity on-site at this time, the primary focus of the FS was on mitigation of potential contact/ingestion risks from contaminated groundwater off-site. However, another remedial action goal advocated by the Agency was elimination of on-site risks associated with highly contaminated soils. Remediation of these soils would minimize future groundwater contamination on-site and accelerate the groundwater restoration process, as well as minimize contact risks should these areas become accessible.

The following is a summary of the findings of the feasibility studies for the Koppers/Galesburg site, as detailed in the proposed plan.

The draft feasibility study for the Koppers/Galesburg site was originally prepared by the RPs during the winter of 1987. Remedial alternatives for significantly contaminated source areas and groundwater were identified, screened and developed to mitigate existing and/or potential human health and environmental threats from these affected media, and improve environmental quality over the long term.

The feasibility study addendum for the Koppers/Galesburg site was prepared by the RPs during the winter of 1988, summarizing a year of supplemental field, laboratory and office work to refine the "engineering details" of the preferred remedial alternative conceptually proposed in the original FS report. Table 2 of Appendix A, among other things, outlines the subsequent pre-design work accomplished toward finalization of this site study. The findings are discussed further in the following sections.

Development of Alternatives

For the Koppers/Galesburg site, the RPs chose to focus initially on appropriate groundwater remedial technologies to address this significant exposure pathway. Soil technologies that were compatible with, and enhanced the chosen groundwater technology, were then selected. Promising groundwater and soil technologies were assembled into several remedial alternatives which, in the professional judgement of the RPs, exceeded applicable or relevant and appropriate requirements (ARARs), attained ARARs or attained CERCLA goals (containment/migration minimization but protective of human health). The no action alternative was also carried along as a baseline for comparison.

The groundwater remedial technology chosen for subsequent screening and development consisted of collection using a combination of shallow interceptor trenches and deeper extraction wells. This system was necessary due to the contrasting surficial geology of silty clay till over sand and the complexity of the existing contaminant plume.

Once extracted, the original draft FS contemplated on-site pretreatment of more "highly" contaminated shallow aquifer water, followed by treatment by the Galesburg Sanitary District POTW; and direct discharge of "less" contaminated deep aquifer water to the Brush Creek surface watercourse.

Appropriate soil and "lime sludge" technologies considered in the original draft FS included: selective "hotspot" excavation in conjunction with on-site landfilling, on-site incineration or on-site biological land treatment. Various combinations of backfilling and/or "capping" of affected material were identified. The reader is referred to the revised draft FS ("Draft Final Feasibility Study Report, Galesburg Wood-Treating Facility; Hunter/ESE; March 30, 1989) for further detail. The original ten assembled alternatives were screened based on environmental, public health and cost criteria. All original ten alternatives were carried forward (including the no action alternative) to the development stage where a detailed analysis was performed based on Agency evaluation criteria in effect at the time (technical,

environmental, institutional, human health and cost factors). The results of this original evaluation are summarized in Table 3 of Appendix A.

As alluded to previously, Agency concerns about the site-specific technical details of the original draft FS prompted significant developmental work on the "preferred" remedial alternative emerging from that evaluation. The remainder of this section is devoted to the finding of the FS addendum (Mathes, May, 1989) which refines that "preferred" alternative and evaluates all viable alternatives under current USEPA procedures.

The additional study work performed by the RPs at the request of the Agency included: a bench-scale biological soil treatment demonstration using representative site wastes; installation of two pumping wells in the sand aquifer and evaluation of their contaminant plume management potential; an evaluation of the feasibility of interceptor trenches to control shallow till aquifer contamination; contaminant migration modeling studies for the site specific groundwater situation (similar work was also performed by an independent USEPA consultant); and a best available technology (BAT) study to identify the most cost effective, treatment option for extracted groundwater(s).

This additional information was used in the FS addendum to supplement the remedial alternative "data base" and allow for a more refined detailed analysis, this time using the current programs "nine evaluation criteria". Six remedial alternatives (including no action) as shown in Table 4 were re-evaluated by the RPs in the FS addendum.

However, two of these alternatives proposed by the RPs, Alternative 1 - No action-soil/lime sludge with BAT groundwater treatment and Alternative 5 - capping-soil/lime sludge with BAT groundwater treatment are considered inadequate final remedies for the following reason. A significant plume of primarily PNA compounds has developed on-site due to past waste disposal in unlined surface impoundments. Given the nature of these compounds and the overburden geology, groundwater restoration to the 10^{-9} cleanup objective of 2.9×10^{-9} mg/l (total carcinogenic PNAs) has been modeled under natural flushing conditions to take an extraordinarily long time. However, further analyses performed to assess the impact of source removal on groundwater restoration indicate that a significant reduction in the estimated remedial period could be realized through removal and treatment of "grossly contaminated" soil hotspots. This model is being revised to evaluate the positive impacts of the proposed groundwater pump and treat system and the effects of natural in-situ bioremediation. There is a fundamental difference of opinion between the Agency and RPs over whether source removal positively affects the groundwater restoration period in a <u>significant</u> way. It is the opinion of the Agency that source removal is warranted given site-specific conditions and therefore the above mentioned alternatives (1 and 5) are not seriously considered as final remedial action plan candidates. Source removal/treatment will eliminate contaminants which would otherwise have to be dealt with in the "very long term" operation and maintenance programs for both protection from potential direct contact and groundwater/surface water exposures.

From the Agency's perspective, the remaining three action alternatives were seriously considered. They share a common BAT groundwater remedial component in conjunction with a source component of on-site : biological land treatment, incineration or landfilling.

To preface the discussion of the evaluation of and between alternatives, it is important to understand the Agency's conceptual approach toward addressing the complex, inter-related source material and groundwater situation which exists at this old facility.

As outlined in the site characteristics section, wastes from the wood-treating process were disposed of in impoundments or on spray fields on the eastern third of the 100 plus acre site. Waste disposal into the lagoons ceased in the 1970's, and spray field wastewater application ended in 1986. Current active wood-treating operations utilize a separation/recycling and biological treatment system for wastewaters. The RPs also have plans to upgrade the drip track with a full containment/collection system once that area is surficially remediated. Future operations, in compliance with applicable requirements, would therefore theoretically not impact the existing environmental problems. Closure of this particular area will then be subject to RCRA regulations in effect at that time.

The remedial action plan then, must address several source hotspots which: 1) are physically located in close proximity to each other within an approximate 800 foot radius of the treatment building, 2) have received similar wastes containing primarily PNAs, phenols and PCP and 3) contribute to common groundwater contaminant plumes migrating in a southeasterly direction away from the area.

The Agency advocates a comprehensive environmental approach of area contamination "hotspot" excavation and on-site remediation using one of the three technologies proposed (land treatment, incineration or landfilling) in <u>combination</u> with area-wide collection/treatment/discharge of contaminated groundwater, which includes appropriate operation, maintenance and monitoring activities. This alternate, or "hybrid" remedial action approach, which consolidates and "manages" the surficial contaminants potentially having the greatest impact on the groundwater restoration program <u>within</u> this "area of contamination", is a logical approach to dealing with this uncontrolled site and is consistent with current guidance for such situations. It is IEPA's and USEPA's position that RCRA requirements are applicable to some of the waste management areas within this "area of contamination". The CERCLA program is envoking an appropriate waiver of portions of these requirements to allow implementation of a more "effective" remedy. This waiver is discussed in detail in the statutory determinations section of this decision summary. Outside of the drip track which is an integral part of the facility and subject to operational regulations, the remainder of the "area of contamination" can be separately managed and monitored without disturbance once remedial construction is complete and the long term groundwater restoration program is underway.

The IEPA cleanup objectives team (COT)/coordinated permit review committee (CPRC) process was used to establish site-specific "clean-closure" objectives for primary constituents of concern in soils in waste disposal areas and

associated contaminated groundwater. Objectives were also established for discharge of extracted groundwaters to surface waters in the Brush Creek system, Cedar Creek system or from the Galesburg Sanitary District POTW. However, because of the significant groundwater problem present, the "clean closure" approach is deemed infeasible, with "alternate closure" providing a protective, action-oriented solution. With that in mind, "clean closure" objectives for soil were dropped in favor of a more obvious, construction oriented measure of contaminant removal with positive impacts for this situation. Objectives for groundwater (both in-situ and for discharge) remain the same and are shown in Table 5 with the associated narratives. These chemical-specific applicable or relevant and appropriate requirements (ARARs) and other considered advisories/guidance are discussed in detail in the statutory determinations section.

For wood-treating wastes, the RPs conducted a site specific evaluation of contaminant mass removal using "visual" criteria for these highly identifiable wastes. Significant reductions in contaminant mass, on the order of 80 percent of contamination present in key hotspots targeted as "major contributors" to groundwater problems, can be removed using an objective method based on visual criteria plus a six-inch buffer layer to a depth that will ensure effective mitigation of contaminants to the groundwater. Samples will be taken to assess these mitigative efforts and to confirm final remediation to health-based levels. This source removal would result in excavation of approximately 15,000 cubic yards of contaminated soil from the north creosote lagoon, drip track area, area east of the retort building and the northeast portion of the PCP lagoon which would optimally benefit the groundwater restoration program. See Appendix A, Figure 7 and associated Table 6 which estimates removal volumes for cost purposes. These excavated wastes would be consolidated within the "area of contamination" and remediated using one of the three soil technologies identified. Excavated hotspot areas will be backfilled with "clean" soil from off-site areas, regraded for positive drainage and vegetated. (A waiver for a portion of the closure requirements is discussed in the statutory determinations section.) Similarly, former waste management areas not targeted for excavation will not be "capped". Instead, a site-wide plan for grading and revegetation of all inactive land within the "area of contamination" is anticipated. This would include appropriate "closure" and "post-closure" care of other areas of concern identified by the RCRA program. The visual criteria approach and resulting hotspot contaminant removal is therefore common to the action remedial alternatives discussed shortly.

Similarly, as mentioned earlier, the groundwater component is common among the action remedial alternatives and can be briefly discussed here and not repeated in the alternative summary section.

Preliminary design hydrogeologic work indicates that the contaminated groundwater plumes can be effectively captured through a system of pumping wells in the deep sand aquifer and "french-drain" type interceptor trenches in the shallow till aquifer, with a combined estimated steady flow rate of 120 gpm. See Figures 8 and 9 attached for a conceptual plan of this system. The RPs propose pretreatment of extracted south shallow till water in the existing on-site plant oily/water separation and biological aeration system prior to discharge to the Galesburg Sanitary District POTW. Studies by the RPs

indicate that the north shallow till aquifer water and the deep sand aquifer water can be effectively treated directly by the POTW. Discharge to the POTW must meet pretreatment regulations and not cause upset or interference to the POTW. The Agency is still evaluating the necessity of pretreating north shallow till water on-site prior to release to the POTW because contaminant levels are an order-of-magnitude higher than that observed in the deep sand water. Additionally, a potential asbestos problem in groundwater must be further studied during the remedial design period, and addressed as necessary in the treatment process outlined. It is anticipated that a limited program of soil and groundwater sampling will be conducted to characterize the nature and extent of asbestos contamination initially observed in the RI in the east central portion of the site. However, the Agency also advocates contingency plans which include on-site "storm management" and compliance monitoring of CERCLA wastewaters to prevent negative site-related impacts on the POTW. The RPs have had discussions with the Galesburg POTW concerning acceptance of the CERCLA wastewaters, and have also used actual treatment plant influent/effluent samples in their BAT analysis. This groundwater remedy has therefore progressed past the conceptual stage to a point where there is engineering confidence that the POTW can treat the quantity and quality of wastewater estimated, and has expressed a willingness to the RPs to do so. If discharge to the POTW for treatment was found to be infeasible during the remedial design phase, on-site treatment of contaminated groundwater and discharge to surface water would be pursued, as the BAT study would be revisited.

In conjunction with this groundwater collection and treatment program, a perimeter groundwater monitoring, operation and maintenance and contingency plan for the "area of contamination" is necessary to assess and maintain the system's protectiveness. Although no specific program was proposed by the RPs in the FS addendum, a nested network of permanent wells monitored on a regular basis for primarily organic contaminants of concern will be developed during RD/RA settlement negotiations and in subsequent remedial design which is consistent with relevant RCRA regulations. Monitoring of the quality of wastewater from the collection system, as well as monitoring of pretreated/combined wastewater prior to discharge to the POTW is also desirable. Because residuals are left on-site after this final remedy is operational, SARA requires five year performance reviews. Therefore, the regular reporting from the groundwater compliance monitoring program will be supplemented as needed to assess the progress of the remedial action at five year intervals.

Remedial Alternative Summary

The alternatives considered in the FS addendum are summarized here prior to evaluation.

- Alternative 1 includes only BAT groundwater treatment as discussed previously. Soil and lime sludge are not treated (inadequate alternative in Agency's opinion).

  Estimated Total Remedial Cost: $2,505,738 (present worth over 30 years)
  Estimated Years to Design and Construct (prior to remedy O&M): 2

- Alternative 2 includes access/land use restrictions, BAT groundwater treatment and on-site biological land treatment of contaminated soil excavated from hotspots and previously excavated contaminated lime sludge stored in three gondola cars in the maintenance shed. Contaminated lime sludge previously excavated and stockpiled on a tarp in the old spray field area will be used as an amendment for biological soil treatment.

  It is important to note at this point that this technology has been successfully evaluated in the laboratory using site-specific wastes. Details are currently being finalized for an on-site field scale biological test cell which will be constructed within the "area of contamination" in the "old spray field" area as shown in Figure 10, Appendix A. A rigorous toxicity testing program has been developed by IEPA to assess the effectiveness of contaminant toxicity and mobility reductions over a three year test period. The bioassay program will directly assess toxicity impacts on representative plant and animal species. Bioassays are an alternative method to assessing risks based on reductions in chemical concentrations of the contaminants of concern. Full scale application of this technology in the (old and/or existing) spray field areas depends on successful demonstration of physical control of the wastes within the test cell and significant reductions in toxicity in relation to initial toxicity, with site background toxicity as the treatment goal. The design of the full scale cell will be consistent with appropriate RCRA regulations. Management options which include seeding, fencing and capping/revegetation have been developed for use depending on the degree of significant contaminant toxicity reduction. Should toxicity not be significantly reduced in the test program, contingency plans will be developed which call for a focused FS of viable soil treatment technologies at that time, and implementation of the most promising one.

  Estimated Total Remedial Cost: $4,286,844 (PW)
  Estimated Years to Design and Construct (prior to remedy O&M): 9
  (includes 3 year demonstration study period)

- Alternative 3 includes access/land use restrictions, BAT groundwater treatment and on-site incineration of contaminated soil and gondola car lime sludge. Contaminated lime sludge stockpiled in the old spray field is proposed by the RPs to be used directly as backfill for excavated areas. The Agency maintains that the stockpiled lime sludge contains levels of contaminants that warrant "treatment" by incineration. Incineration would be consistent with RCRA regulations. Treatment of lime sludge would increase the estimated cost of this remedy somewhat above the RPs quoted figure. The RPs propose that incinerator ash could be backfilled on-site. Disposal of ash would be consistent with relevant RCRA regulations.

  Estimated Total Remedial Cost: $18,266,871 (PW)
  Estimated Years to Design and Construct (prior to remedy O&M): 4

- Alternative 4 includes access/land use restrictions, BAT groundwater treatment and on-site landfilling of contaminated soil and gondola car lime sludge. Contaminated lime sludge stockpiled in the old spray field

is proposed by the RPs to be used directly as backfill for excavated areas. As in Alternative 3, the Agency maintains "treatment" of this lime sludge would be necessary, or in this case, containment. The RPs have proposed to design this "unit" as a single, bottom lined cell in the southeast portion of the site within the "area of contamination". The Agency maintains that this cell and cap be designed to meet minimum technology requirements of the RCRA Subtitle C Hazardous Waste Regulations. These modifications would increase the cost of this remedy somewhat above the RPs quoted figure.

Estimated Total Remedial Cost: $5,243,432 (PW)
Estimated Years to Design and Construct (prior to remedy O&M): 3

- Alternative 5 includes access/land use restrictions, BAT groundwater treatment and "capping" of soil and lime sludge. The RPs propose that contaminated soil from the drip track area, gondola cars and old spray field lime sludge area would be consolidated in the PCP lagoon. The PCP lagoon, the area east of the retort building and the north creosote lagoon would be covered with clay (no thickness specified) and revegetated. The drip track area would be backfilled with off-site soil prior to construction of a new spill/drip containment system. (The Agency deems this an inadequate remedy for several reasons, foremost of which is its failure to benefit the groundwater remedial program as previously mentioned and SARA states "consistency with other actions" in which excavation and treatment of "hotspot" soil areas would enhance the groundwater remedy.)

  Estimated Total Remedial Cost: $2,867,774 (PW)
  Estimated Years to Design and Construct (prior to remedy O&M): 2.5

- Alternative 6. The CERCLA program requires that the "no-action" alternative be considered at every NPL site. In this instance, the RPs have included routine monitoring on-site of the till and sand aquifers to assess contaminant migration off-site.

  Estimated Total Remedial Cost: $632,857 (PW)
  Estimated Years to Design and Construct (monitoring well network prior to assessment program initiation): 0.5

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives that were developed in the Koppers/Galesburg FS addendum were evaluated by the RPs and by the Agency using the following nine criteria. Advantages and disadvantages of each alternative were then compared to identify the preferred alternative that provides the best balance among these nine criteria.

1. Overall Protection of Human Health and the Environment addresses whether or not the remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not the remedy will meet all of the applicable or relevant and appropriate requirements or provide grounds for invoking a waiver.

3. Long-term Effectiveness and Permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup objectives have been met.

4. Reduction of Toxicity, Mobility, or Volume is the anticipated performance of the treatment technologies a remedy may employ.

5. Short-term Effectiveness involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup objectives are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. Support Agency Acceptance indicates whether, based on its review of the RI/FS and proposed plan, the support agency concurs, opposes, or has not commented on the preferred alternative.

9. Community Acceptance is assessed in the decision summary following a review of the public comments received on the RI/FS report and the proposed plan.

The IEPA and USEPA identified their preferred alternative in the proposed plan for the Koppers/Galesburg site as Alternative 2 - biological soil treatment, BAT groundwater treatment and access/land use restrictions. The strengths and weaknesses of the action-oriented remedial alternatives that were under consideration by the Agency are outlined below, focusing on the qualities of the preferred alternative.

Overall Protection

All of the action alternatives (Nos. 1-5) would provide protection of human health and the environment by eliminating, reducing or controlling risks through various combinations of treatment, engineering controls and/or institutional controls.

Protection from exposure to contaminated groundwater is achieved for the preferred alternative, as well as the other action alternatives, by implementing and maintaining a hydraulic groundwater containment system that slowly flushes contaminants from the overburden aquifers. Collected groundwater is pretreated as necessary on-site in the modified active facilities' wastewater treatment system, followed by final treatment and discharge at the Galesburg Sanitary District POTW. The key to overall protection for this long-term groundwater action is a compliance monitoring

plan in conjunction with an established contingency and operation and maintenance program. The reality of the situation is that the maintenance of this system becomes less certain as the restoration period increases. Therefore, the Agency supports remedies which would reduce additional source contributions to groundwater and prolong aquifer restoration. The preferred alternative 2 and alternatives 3 and 4 provide for source remedial work to compliment their groundwater component and also eliminate/reduce risk from direct exposure to contaminants of concern. The presence of the active wood-treating facility, coupled with deed and access restrictions anticipated to be self-imposed by the RPs, also enhances protection from contaminated groundwater or soils, as long as these controls are enforced.

Compliance with ARARs

It is the Agency's position that all of the action alternatives do not meet identified applicable or relevant and appropriate federal, state and local requirements. It appears without further technical justification that alternative 4 - landfilling and alternative 5 - capping do not meet potential action-specific technology based ARARs for source remedial components as proposed. Chemical-specific groundwater ARARs may be met under alternatives 1 and 5, however restoration times would conceptually far exceed that estimated for alternatives 2, 3, and 4. The Agency's analysis of ARARs for the preferred alternative is discussed in the statutory determinations section. All ARARs are met, or a waiver justified, for the preferred alternative.

Long-term Effectiveness and Permanence

As discussed previously, given the site-specific conditions, a very long term groundwater remedial action is inevitable. The long term effectiveness and "permanence" of the groundwater remedy in the preferred alternative, as well as that component of other action alternatives, hinges on the implementation and maintenance of the engineered collection/treatment systems, compliance monitoring and contingency programs and on-site institutional access and land use restrictions. Therefore, because long-term management of wastes is necessary, "permanence" is only "artificially" achieved through an effective operation and maintenance program.

The differences among the long term effectiveness and permanence of the various source remedies under consideration is the key to selection of the preferred alternative for this site. Landfilling physically isolates the contaminant mass from the groundwater, however operation and maintenance activities and eventual replacement requirements are "heavy". Management of the biological land treatment cell could consist only of standard cover/vegetation management, as it is anticipated that wastes will be significantly, irreversibly treated and not require leachate control as in the landfill option. Incineration would conceivably destroy all contamination in the soil, obviously constituting irreversible treatment. If direct backfilling on-site of incinerator ash is allowed, minimal maintenance would be necessary. Alternative 3 - incineration, followed by the preferred alternative, 2 - biological soil treatment, offer the most long term effectiveness and permanence by eliminating or treating wastes and limiting future operation and maintenance work, with respect to the source remedial component.

Reduction of Toxicity, Mobility or Volume

Of the source action alternatives, 3-incineration will completely destroy the organic contaminants of concern in the source material to be remediated. Toxicity, mobility and volume are therefore optimally reduced. However, the preferred alternative, 2 - biological land treatment is also effective in significantly reducing primarily the mobility and toxicity of that contaminant mass. Landfilling, alternative 4 and in-situ capping, alternative 5 do not treat the source material but rather rely on physical containment measures to only limit mobility to the groundwaters.

The common groundwater remedial component of the action alternatives provides a significant reduction in toxicity, mobility and volume of contaminant mass in that media by physically limiting migration of the plume (mobility), then over time extracting and biologically degrading the organic contaminants in the wastewater treatment train previously outlined (toxicity and volume reduction).

The preferred alternative is therefore action oriented, utilizing treatment technologies for both soil and groundwater components, to breakdown the wastes to non-toxic residuals.

Short-term Effectiveness

The short-term effectiveness of the five action alternatives are similar in that they present a threat to construction workers, facility staff, the immediate public surrounding the site and the environment. The action alternatives that do not propose contaminated soil excavation, handling and treatment/containment (alternatives 1 and 5) would conceptually pose less of a short-term risk because there is less chance for exposure from contaminant volitalization or wind/water erosion off-site and the implementation periods are shorter. However the relative remoteness of this site in an industrial/agricultural area, the use of standard health and safety equipment/procedures, construction monitoring and engineering controls such as dust suppression and clean water diversion will minimize these threats. The preferred alternative, 2 - biological soil treatment takes the longest of the action alternatives to implement, however, site control is established through the presence of the wood-treating facility and therefore implementation of the CERCLA remedial action is consistent with routine plant activities, posing a "minimal" additional operation and maintenance burden for the source component. All of the action alternatives would require similar operation and maintenance attention for the groundwater pump and treat system over the long term.

Implementability

All action alternatives propose to utilize proven remediation technologies and standard construction equipment and procedures and are thus technically feasible. Incineration would require a site-specific technology demonstration before allowing full-scale operation. The biological land treatment technology has been successfully demonstrated in a bench scale study for site-specific wastes, as well as in the field for similar wastes at other

sites. A demonstration field study has also been fashioned for the Koppers/Galesburg site, as previously discussed. The common groundwater remedial component utilizes standard industry technologies for wastewater treatment. Site-specific application has been demonstrated through the BAT study. There will however be administrative requirements that must be fulfilled, such as a modification to the facilities' existing NPDES permit to account for CERCLA wastewater prior to implementation of the remedy.

Cost

The estimated capital cost for design and construction of each alternative, and the associated operation and maintenance, normal replacement and monitoring present worth costs over a nominal 30 year period (for cost estimating purposes only) for a 10 percent discount rate are given in Table 7. The total estimated cost for the preferred alternative, 2 - biological land treatment/BAT groundwater treatment is $4,286,844. The costs for the only other treatment oriented remedy, alternative 3 - on-site incineration/BAT groundwater treatment is approximately four times greater than the preferred alternative. Post 30 year long-term groundwater treatment and monitoring/contingency costs will obviously be required based on the complexity of the groundwater restoration process for this site.

Support Agency Acceptance

USEPA, Region V supports the preferred alternative. The Illinois/Indiana section of the Remedial and Enforcement Response Branch, Waste Management Division, has been involved in the technical review of this state-lead enforcement RI/FS and the development of the proposed plan and this ROD.

Community Acceptance

A comprehensive community relations program has been implemented for this site. Several informational meetings have been held, as well as the recent public hearings. Fact sheets have been distributed to an extensive list of public officials, the media, concerned private individuals and groups, as well as the RPs and their engineering consultants.

The responsiveness summary, Appendix B to this decision summary, details oral comments received at the public hearings, as well as written comments received from the RPs' consultant and the public. For conciseness and clarity, these comments are paraphrased and grouped together where possible, prior to the Agency's response.

No comments were received which conceptually disagreed with the components of the Agency's preferred alternative as identified in the FS addendum and proposed plan. The RPs' consultant submitted comments on the technical scope of the remedial action plan proposed by the Agency. All comments have been carefully considered in the selection of the final remedy for the Koppers/Galesburg site.

X. SELECTED REMEDY

Based on existing site information, the RI/FS by the RPs and the analysis of remedial alternatives using the nine evaluation criteria, the Agency has selected Alternative 2 - biological soil treatment, BAT groundwater treatment and access/land use restrictions as the final remedy for the Koppers/Galesburg site. In brief, this remedy consists of:

- Demonstration of the biological treatment technology in an on-site field-scale cell.
- Excavation of visibly contaminated soils plus a six-inch buffer zone from "hotspot" areas to a depth that ensures effective mitigation of groundwater contamination. Samples will be taken to assess these mitigative efforts and to confirm final remediation to health-based levels.
- Backfilling of excavated areas with "clean" soil; regrading/revegetation of affected areas.
- Phased biological treatment of excavated contaminated soils in an on-site "engineered" cell.
- Long-term management of treated soils in-place.
- Collection of contaminated groundwater from the site.
- Pretreatment of contaminated groundwater on-site as necessary; final treatment at POTW.
- Routine monitoring of groundwater collection/treatment systems.
- Access and land use restrictions for affected areas.
- Five year evaluations; contingency plans implemented as necessary.

In summary, this remedial action plan, with proper operation and maintenance, permanently reduces the toxicity, mobility and volume of site source and groundwater contamination through a combination of treatment, engineering and institutional controls.

The existing and/or potential risks associated with direct contract of source materials and migration of contaminated groundwater are effectively mitigated. Highly contaminated soils are potentially treated to background toxicity levels and managed on-site over the long-term. Contaminated groundwaters are contained at the eastern and southern edge of the site in areas under the control of the RPs, and eventually treated over the long-term to the 10^{-6} excess carcinogenic risk goals at the "compliance points", the downgradient boundaries of the identified waste management areas.

This final remedy is therefore protective of human health and the environment, attains ARARs or invokes an appropriate waiver, and is cost-effective while

providing a permanent, environmentally sound solution for the entire site that employs treatment and/or resource recovery technologies to the maximum extent practicable.

XI. STATUTORY DETERMINATIONS

Section 121 of CERCLA requires that the selected remedy:

- Be protective of human health and the environment;
- Attain ARARs (or provide grounds for invoking a waiver);
- Be cost-effective;
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- Address whether the preference for treatment that reduces toxicity, mobility or volume as a principle element is satisfied, or provide an explanation in the decision summary why it is not satisfied.

The selected remedy for the Koppers/Galesburg site, Alternative 2 - biological soil treatment, BAT groundwater treatment and access/land use restrictions is briefly summaried below in relation to each of the statutory requirements.

Protection of Human Health and the Environment

The selected remedy effectively reduces risks to human health and the environment from contaminated soil and groundwater by:

1. Excavating highly contaminated soils, treating them biologically on-site in an engineered cell followed by management in-place as necessary; and
2. Collecting contaminated groundwater through a trench/well system; treating it biologically on-site as necessary prior to final treatment by the POTW; monitoring aquifer restoration and modifying the program as necessary.

Direct contact and inhalation (dust) soil risks are reduced by the source remedy, while the groundwater remedy prevents off-site contaminant migration and associated contact and ingestion risks in the short-term and eliminates these risks through treatment in the long-term.

Health-based chemical-specific clean-up objectives have been developed by IEPA for site groundwater, surface water, soils and sediments (see Appendix A, Table 5, plus supporting information) through its COT/CPRC process. Since "clean closure" of contamination "hotspots" is infeasible, health-based soil/sediment clean-up objectives will not be initially used. Instead, a visual criteria will be implemented to remove and subsequently treat highly contaminated soils. However, groundwater, surface water and soil clean-up objectives that are protective of human health and the environment will be met through implementation of the selected remedy.

The selected remedy will be implemented on-site in areas owned and controlled by the RPs. It is believed the surrounding rural community will not be adversely affected in the short term by remedial activities because of the use of prudent construction practices such as erosion control/clean water diversion and dust suppression to minimize contaminant migration through the surface water and air pathways. Monitoring activities will be implemented to assess contaminant control, with contingency plans utilized as necessary. No cross-media impacts are anticipated because detailed engineering plans will be implemented with a high degree of control of excavated soils and extracted groundwater to minimize interaction with "clean" areas/medias. Additionally, data suggests that there will be limited volatilization of contaminants of concern during handling, due to their chemical nature. This quality will aid in minimizing air impacts from contaminants that will be consolidated and treated.

Attainment of Applicable or Relevant and Appropriate Requirements

Section 121(d) of SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. These laws may include: the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Safe Drinking Water Act (SDWA), and any state law which has stricter requirements than the corresponding federal law. A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Section 104 or Section 106 of CERCLA. A "relevant and appropriate requirement" is one that, while not legally applicable to the remedial action, addresses problems or situations sufficiently similar to those encountered at the site that their use is well suited to the remedial action.

Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of ARARs; however, where no applicable or relevant and appropriate requirements exist, or for some reason may not be sufficiently protective, non-promulgated advisories or guidance documents may be considered in determining the necessary level of clean-up protection of human health and the environment.

Additionally, Section 121 of SARA provides that under certain circumstances an otherwise applicable or relevant and appropriate requirement, ARAR, may be waived if:

- the remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed;
- compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative operations;
- compliance with such requirements is technically impracticable from an engineering perspective;
- the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach;

- with respect to a State standard, requirement, criteria, or limitation, the State has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions within the State; or

- in the case of a remedial action to be undertaken solely under section 104 using the Fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health or welfare or the environment at the facility under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats.

The selected remedy for the Koppers/Galesburg site, Alternative 2 - biological soil treatment, BAT groundwater treatment and access/land use restrictions will attain ARARs described below, or utilize a waiver, in this case for a portion of the action-specific ARARs identified.

The following chemical-specific, location-specific and action-specific ARARs and other considered advisories/guidance are outlined for the groundwater and source components of the selected remedy. Justification for the ARAR waiver is also provided.

Chemical-specific ARARs and other considered advisories/guidance describe the "level" at which the contaminants could safely be found in the environment.

The clean-up levels identified by the previously described COT/CPRC process for groundwater and surface water are ARARs in the opinion of the Agency, a position not shared by the RPs. The objectives are derived from promulgated state water quality standards, and, for contaminants where no standards exist, federal ambient water quality criteria are used as relevant and appropriate to the remedial action. To continue this general train of thought, there are no state or federal ARARs for the contaminants found in the soils and sediments on-site. The original COT/CPRC "clean-closure" clean-up levels for these soils and sediments fall in the category of non-promulgated advisories, which were initially considered by the Agency in the development of the source remedial action. However, excavation to these levels on-site has been demonstrated to be infeasible. Instead, a visible removal criteria has been adopted which, when implemented in "hotspot" contaminant deposition areas, will optimally benefit the groundwater remedy and contribute to the protection of human health and the environment in an efficient manner.

Various RCRA requirements appear to be either applicable or relevant at this old manufacturing facility. Before applying (or waiving) those requirements it is necessary to discuss the Agency's assessment of the regulated Hazardous Waste Management Units (HWMUs) and the Solid Waste Management Units (SWMUs) on-site.

RCRA requirements are applicable to areas of a site that contain RCRA listed or characteristic hazardous waste and that waste was received or significantly

managed after November 19, 1980, the effective date of RCRA. The first point, the classification of wastes present within the "area of contamination" is in dispute between the IEPA/USEPA RCRA programs and the RPs. Taking the position of the Agencies that this waste is listed, the second point can be addressed. It appears the following areas received waste before the effective date of RCRA and have not been significantly managed since (ie. RCRA regulations are relevant):

- North creosote lagoon
- South creosote lagoon
- Old spray field area
- Area east of the retort building

It appears the following areas have been managed to various degrees by the RPs as part of their plant operations since the effective date of RCRA (ie. RCRA regulations are applicable):

- Drip track area*
- PCP lagoon
- Existing spray field area
- Waste pile (relocated to north creosote lagoon)
- Interceptor ditch

It appears the following areas have been significantly managed by the RPs under the terms of the 1985 state superfund Consent Decree (ie. RCRA regulations are possibly applicable):

- BN slurry pond (with excavated lime sludge stored in a tarped pile and in three lined gondola cars on-site)

The facility also contains a drum storage area inside the treatment building which temporarily holds currently generated waste prior to off-site shipment/disposal.

The point of this exercise is to show the complexity of the waste management situation at the site. The CERCLA position is that soils within all of these areas contain "RCRA hazardous constituents" that have been released, or have the potential to be released to primarily the groundwater media. RCRA requirement are therefore <u>at least</u> relevant to all remedial efforts (HWMUs and SWMUs within the CERCLA "area of contamination").

To return to the chemical-specific ARAR issue, RCRA section 3004(u) and 3004(v) and 40 CFR Part 264, Subpart F require corrective action for releases of hazardous waste or constitutents from "units" requiring a RCRA operating permit. Corrective action goals are similar to CERCLA remedial objectives,

*NOTE: The drip track area is currently considered a SWMU, however, proposed RCRA rules currently under consideration would classify this area as a HWMU. The selected remedy is intended to satisfy corrective action concerns for the drip track area, however, active operations would be subject to other RCRA regulations under a future permit.

foremost of which is to be protective of human health and the environment. The selected remedy has been shown to achieve that goal through the CERCLA evaluation documented in this decision summary.

First, to address the reclamation of the affected aquifers, the RCRA Subpart F regulations require the establishment of concentration limits for hazardous constituents released from waste management "units" and the treatment of groundwater exceeding those limits at the "point of compliance" as defined at 40 CFR 264.95. The "points of compliance" for groundwater migrating from the "area of contamination" are the downgradient boundaries of the former waste management areas. Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (SDWA) are potentially applicable or relevant and appropriate standards for Class I or II aquifers. The shallow till unit would generally be considered a Class III aquifer under modern criteria, due to its low yield. One shallow well has been identified east of the Kopper's site, adjacent to the northeast corner of the Steagall Landfill, that utilizes that aquifer. Contamination has been observed in that well and the residents have voluntarily discontinued its domestic use. The State is pursuing proper closure of this well as part of the implementation of the Phase I Steagall Landfill on-site remedy.

In contrast, the deep sand unit on the Koppers/Galesburg site would be considered as Class II, being currently used as a source for drinking water. Although this aquifer is not currently used as a public water supply, MCLs would be relevant because the groundwater is used individually by local residents. However, MCLs are not appropriate in this case as COT/CPRC clean-up levels have been established to be protective of human health and the environment. Contaminated groundwater from the site has the potential to recharge to Brush Creek. The COT/CPRC clean-up levels are based on state general use water quality standards, where available, and supplemented by federal ambient water quality criteria to ensure the water quality requirements in the sensitive Brush Creek system are maintained in the future.

Next, to address the handling of contaminated groundwater during the restoration process, it is again noted that the selected remedy utilizes a combination of pretreatment of a portion of the extracted groundwater on-site followed by final treatment by the local POTW.

The discharge of extracted groundwater to either a surface water body or to the local POTW is regulated by appropriate sections of the Clean Water Act (CWA) and Illinois water pollution control rules (35 Illinois Administrative Code (IAC) Subtitle C). COT/CPRC levels were developed to meet these requirements for two potential situations, direct discharge to intermittant streams (both Cedar and Brush Creeks) and also from the POTW. The RPs have completed a best available technology (BAT) assessment on the groundwater(s) from the site. Discharge limits are established based on application of BAT or more stringent limits, if necessary, to assure the receiving water meets applicable State water quality requirements.

The discharge of treated groundwater to the preferred location, the Cedar Creek system, will meet the substantive requirements of the CWA National Pollutant Discharge Elimination System (NPDES). Discharge of groundwater to

the POTW will meet the substantive requirements of applicable federal pretreatment standards, DWPC rules and local ordinances. It appears from the studies conducted by the RPs that the selected groundwater action will meet these requirements and the Agency clean-up levels.

No location-specific ARARs or other considered advisories/guidance were identified by the RPs or IEPA/USEPA for the selected on-site remedy. (RCRA location-specific requirements are addressed in the context of the treatment technology discussion which follows).

Action-specific ARARs and other considered advisories/guidance usually describe the method or level of control under which the contaminants should be managed in the environment.

For the selected remedy which calls for excavation, consolidation and treatment of highly contaminated soils and stored lime sludge within the defined "area of contamination", substantive RCRA Subtitle C closure, post-closure (monitoring, maintenance and reporting) and land treatment unit requirements are the primary ARARs to be addressed. As pointed out previously, these requirements appear to be applicable to several waste areas, and relevant to the rest. RCRA land ban requirements were not determined to be ARARs based on the concept as previously defined of consolidation, treatment and final deposition within the CERCLA "area of contamination" on-site. This source remediation would not constitute "placement" under RCRA which is a prerequisite to the consideration of land ban requirements.

"Clean closure" of the affected areas is infeasible due to the existing complex groundwater problem. "Closure in-place" is not deemed appropriate due to the adverse impact that unremediated source materials would have on the groundwater restoration period. It has therefore been determined by the Agency that a "hybrid" or "alternate closure" approach is the most appropriate for the given site circumstances.

The selected CERCLA remedy therefore utilizes appropriate aspects of both RCRA "clean closure" and "in-place closure". A key aspect of RCRA closure that was determined not to be appropriate was installation of a RCRA compliant cap over excavated "hotspots" or other waste areas.

Pursuant to RCRA, closed "units" should have a final cover which minimizes liquid migration, minimizes maintenance, promotes drainage, accommodates subsidence and has a permeability less than or equal to the permeability of its bottom liner (in this case no liners were used). It is necessary to waive this final cover ARAR for the Koppers/Galesburg site for the following reasons.

The compliant remedial action [with RCRA caps] poses greater risks to human health and environment in the sense that the risks are more long lasting; and these prolonged risks could cause additional, "irreparable" damages. The alternative, the selected remedy for the Koppers/Galesburg site, is a backfilled "loose" clean cover that allows flushing into the two aquifers, the aquitard and the sand aquifer. This active recharge system is necessary to increase infiltration through the residual contaminated material and leachability into the groundwater collection system capture zone. In

addition, the alternative selected remedy promotes flushing into contaminated horizons which creates an oxidized state necessary for natural biodegradation of those contaminants. The compliant remedy would prevent infiltration of water into contaminated horizons which would decrease leaching of contaminants toward the groundwater collection points and also create an oxygen reduced state that hinders natural in-situ bioremediation and progress of the remedial action. Modeling has demonstrated that the compliant remedy could significantly increase the predicted remediation time and duration of adverse aquifer impacts. The risks posed by the selected remedy are signficantly less than the risks posed by the compliant remedy because the selected remedy decreases remediation time, promotes treatment to the maximum extent practicable, and reduces toxicity of the contaminants through infiltration and leaching of residual contaminants into the groundwater collection system and in-situ bioremediation of the residual contaminants.

In addition to a final cover, RCRA regulations require long-term maintenance and monitoring to ensure the covers integrity. The selected remedy conceptually includes such operation, maintenance, reporting, financial assurance and contingency planning to protect the cover implemented, as well as the groundwater collection and pretreatment systems.

Similarly, the selected remedy conceptually includes monitoring plans to meet the substantive RCRA Subpart F groundwater monitoring, maintenance and reporting requirements and contingency measures which are relevant and appropriate to all waste areas and applicable to some. However, because of the "common nature" of the groundwater contaminant plumes, it is anticipated that this network will monitor the perimeter of the "area of contamination", focusing on the downgradient "points of compliance" of former waste management areas to ensure the established clean-up levels are met until the groundwater restoration is confirmed as complete.

Finally, with respect to on-site biological treatment of highly contaminated soils, RCRA Subpart M, land treatment design and operating requirements must be addressed.

The selected remedy calls for a field-scale demonstration study using a biological monitoring program over a three year time frame. Successful site-specific bench-scale studies have already been completed. This pilot program will be conducted within the "area of contamination" in the general location of the old spray field area in a controlled, "engineered" quarter-acre unit. This unit will approximate full scale waste loading characteristics and operating conditions, with the flexibility for mid-test modifications as necessary. The Agency will closely monitor this treatment demonstration, looking both at toxicity and mobility reductions of contaminants. Site-specific full scale design and operating parameters for a three to five acre treatment cell will be developed based on the results of this pilot study.

RCRA land treatment requirements have been considered in the preliminary design of the selected remedy. The most appropriate area in which to locate this treatment cell is in the vicinity of a former affected area, the old spray field, which is remotely located near the major excavation area, the

north creosote lagoon. Studies in this area have shown the potential for a high water table condition in the till soils. The RPs have proposed to install a high density polyethylene (HDPE) liner in the pilot cell to avoid adverse affects on the treatment zone by groundwater intrusion. At the same time, monitoring will be conducted within the pilot cell to look at migration of contaminants into a representative lift of the subsoil.

RCRA requirements that must be addressed in the remedial design include a provision that, "the maximum depth of the treatment zone must be: 1) no more than 5 feet from the initial soil surface; and 2) more than 3 feet above the seasonal high water table." Unsaturated zone monitoring requirements are also relevant to the biological treatment cell.

Treatment zone depth to water table limitations will be assessed in the pilot study findings. If water table conditions present a significant problem they could be artificially controlled by a liner under the full scale cell, a subsurface drainage tile system beneath the cell or placement of a clean soil subbase layer prior to initialization of the treatment zone. The depth limitations for the treatment zone should not present a problem as adequate area is available to properly size the treatment cell. It is anticipated given the site surficial geology and nature of the waste contaminants that significant leaching from the treatment cell will not be realized. However, groundwater monitoring needs for the treatment cell will be dictated by the results of the pilot study.

Other operating, maintenance, reporting, closure and post-closure requirements of Subpart M will be substantively complied with under the selected remedy. No food chain crops will be grown in or on the treatment unit during or after remediation is complete. Final cover requirements will be dictated by the degree of treatment achieved by the unit. No wind dispersion will be allowed, with vegetation establishment being the minimal cover management option. Post-closure care will most likely be added to the routine responsibilities of on-site wood-treatment facility personnel.

Cost Effectiveness

The total present worth cost of the selected remedy, as estimated by the RPs, is $4,286,844. The selected remedy was chosen over less expensive remedial alternatives because the additional "protection" provided by biological treatment of highly contaminated soils was judged to outweigh additional costs above that for the basic groundwater remedy. Two alternatives were more expensive then the one selected. Development of an on-site landfill as a source remedy was judged to be less "protective" than biological treatment by the Agency. Incineration conceptually provides greater "protection" than biological treatment through total destruction of source materials. However, the significant additional cost of incineration over biological treatment was judged to be unwarranted by the Agency with respect to the additional "protection" achieved by that technology.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy includes biological treatment of both contaminated soils and groundwaters. A portion of contaminants in collected shallow till groundwater will be recovered in the on-site pretreatment process using the active facilities' system. This remedy was judged by the Agency to provide the best balance among tradeoffs between the nine evaluation criteria, while utilizing treatment technologies to the maximum extent practicable.

This remedy offers a greater degree of "permanence" with respect to the source action than the other developed alternatives, except incineration. Significant reductions in contaminant toxicity and mobility are expected from biological treatment which, with proper minimal management, would provide similar "permanence" at a much lower remedial cost. The groundwater remedy, common to all alternatives, treats contaminated waters to health-based risk levels over the long-term. An effective operation and maintenance program is required to "artificially" achieve "permanence" for this groundwater action. However, the Agency believes that this program can be successfully implemented under the terms of the anticipated RD/RA Consent Decree with the RPs.

Preference for Treatment as a Principal Element

The selected remedy treats both highly contaminated soils on-site, and contaminated groundwaters on-site as necessary, followed by off-site final treatment by the POTW. Thus, this remedy satisfies the statutory preference for utilization of treatment technologies to address the principal threats posed by the Koppers/Galesburg site.

KOPPERS/GALESBURG DECISION SUMMARY

APPENDIX A -- FIGURES AND TABLES

SCALE: 1"= 25.6 MILES

SOURCE: RAMP, 1983

Figure 1
LOCATION MAP
KOPPERS GALESBURG SITE

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

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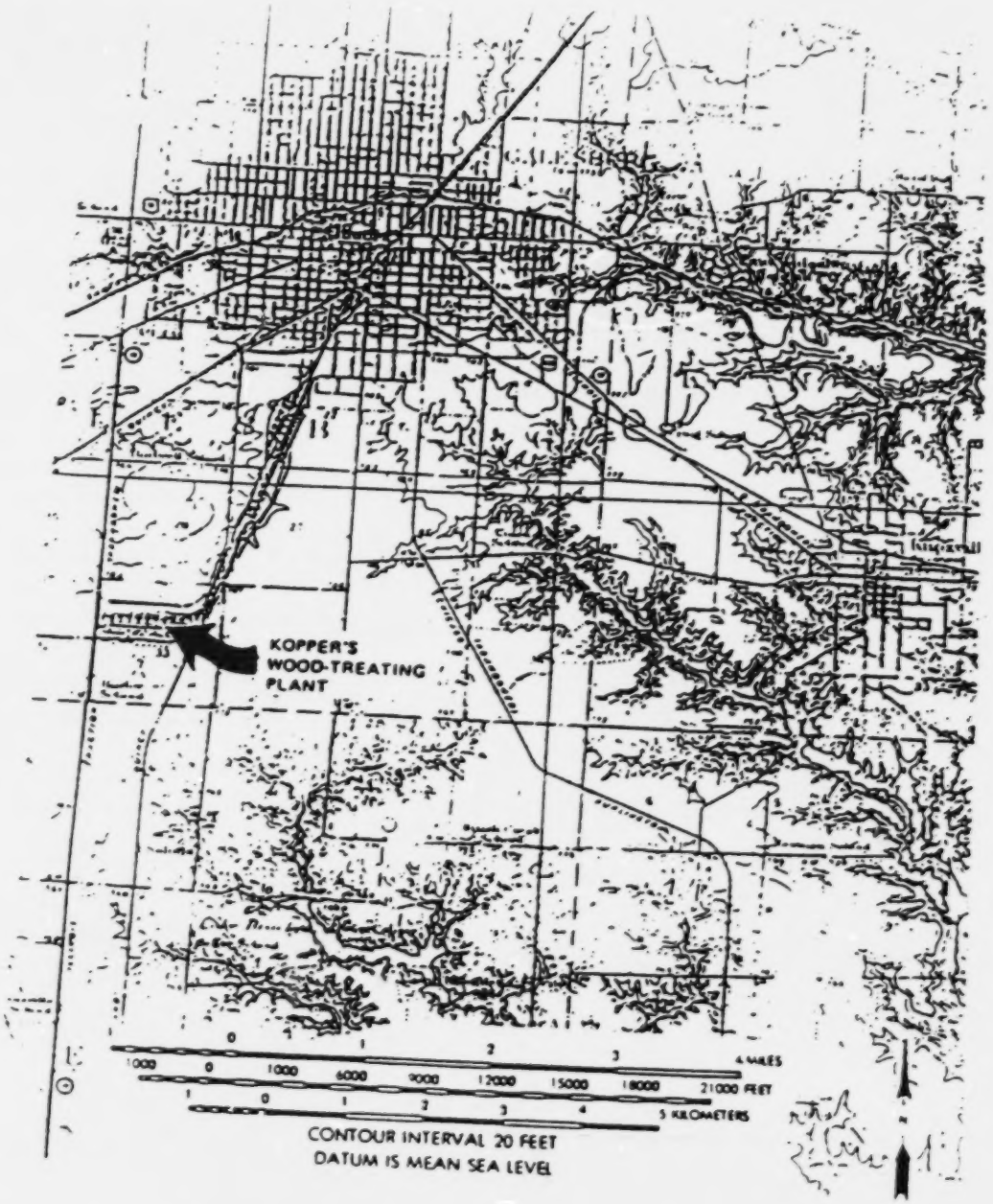

KOPPER'S
WOOD-TREATING
PLANT
0 1 2 3 4 MILES
1000 0 1000 6000 9000 12000 15000 18000 21000 FEET
1 0 1 2 3 4 5 KILOMETERS
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

SOURCE RAMP 1983

Figure 2
VICINITY MAP
KOPPERS GALESBURG SITE

ENVIRONMENTAL SCIENCE
AND ENGINEERING, INC.

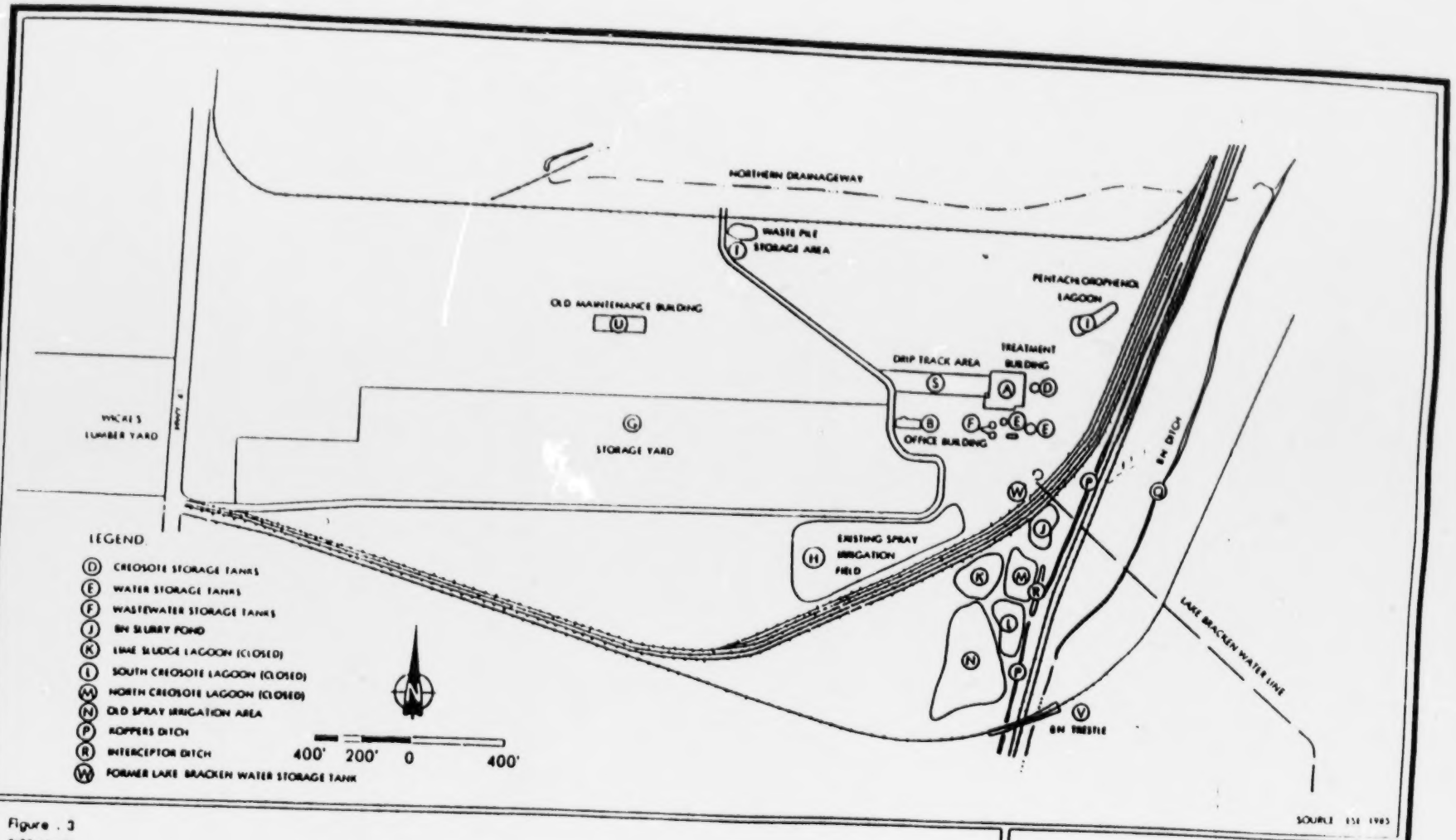


Figure . 3
SITE MAP
KOPPERS GALESBURG SITE

ENVIRONMENTAL SCIENCE
AND ENGINEERING, INC.

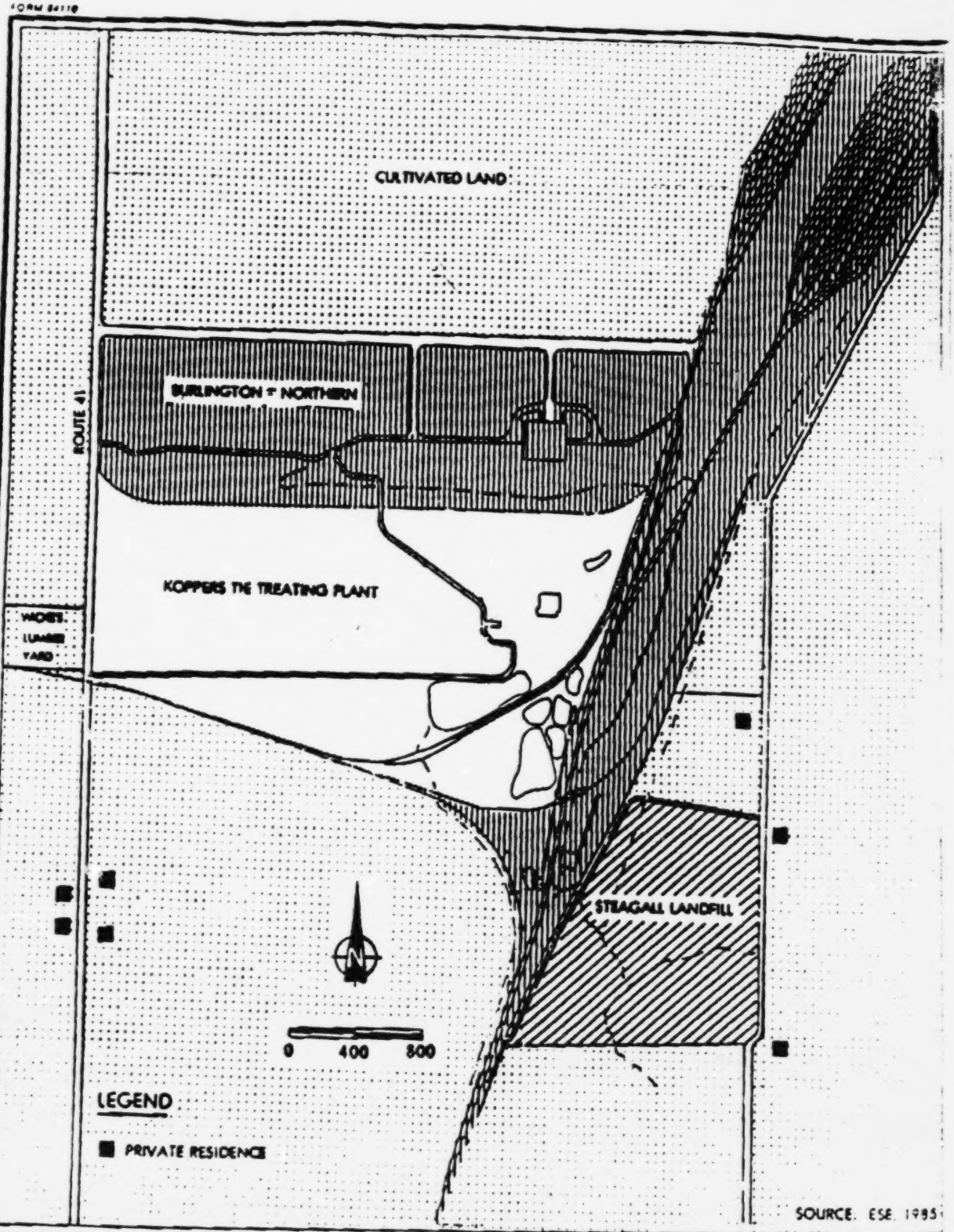
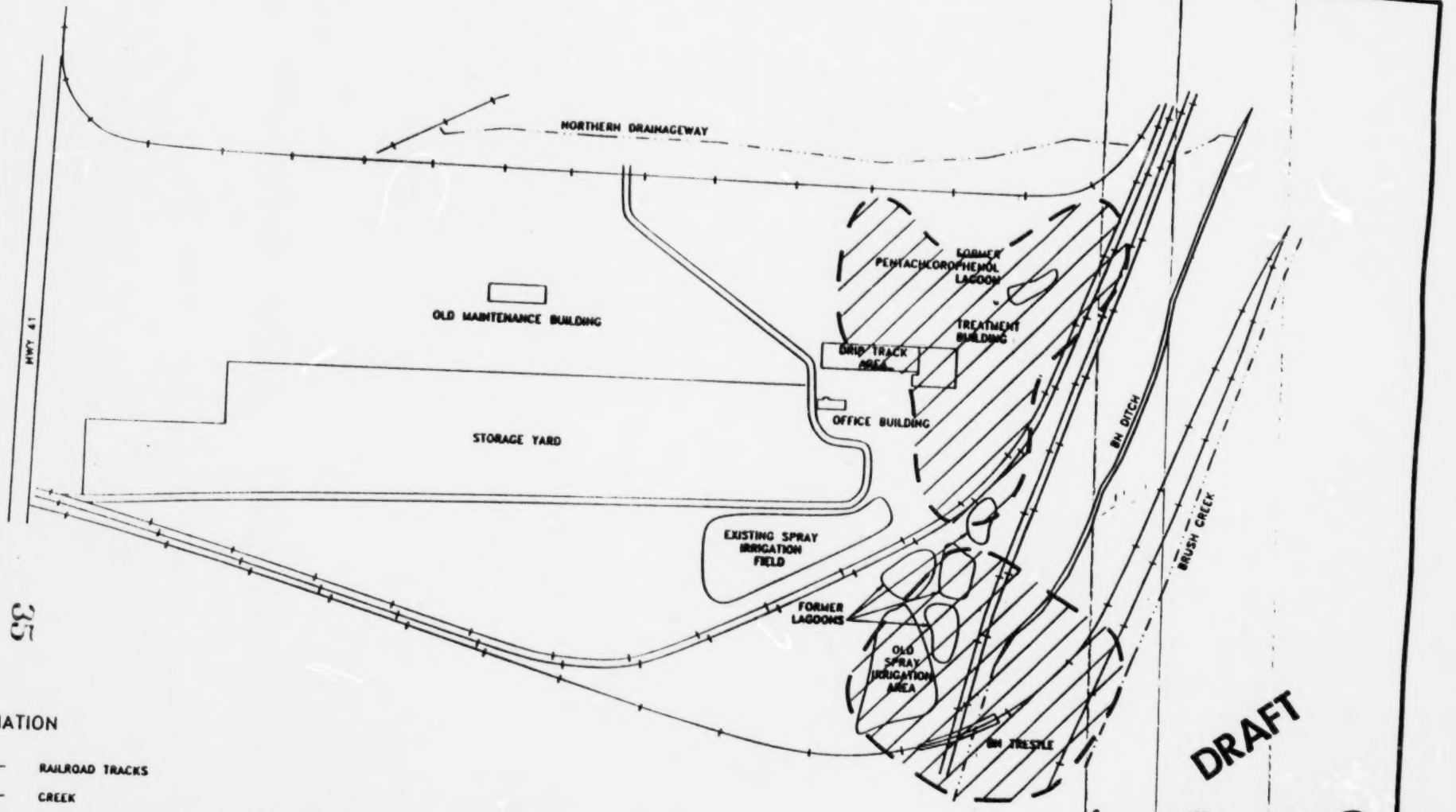


Figure 4
LAND USE SURROUNDING KOPPERS GALESBURG PLANT
KOPPERS GALESBURG SITE

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.



ANATION

RAILROAD TRACKS

CREEK

ESTIMATED BOUNDARY OF SHALLOW TILL AQUIFER GROUNDWATER PLUME

p modified from Environmental Science and Engineering, Inc., 1985.

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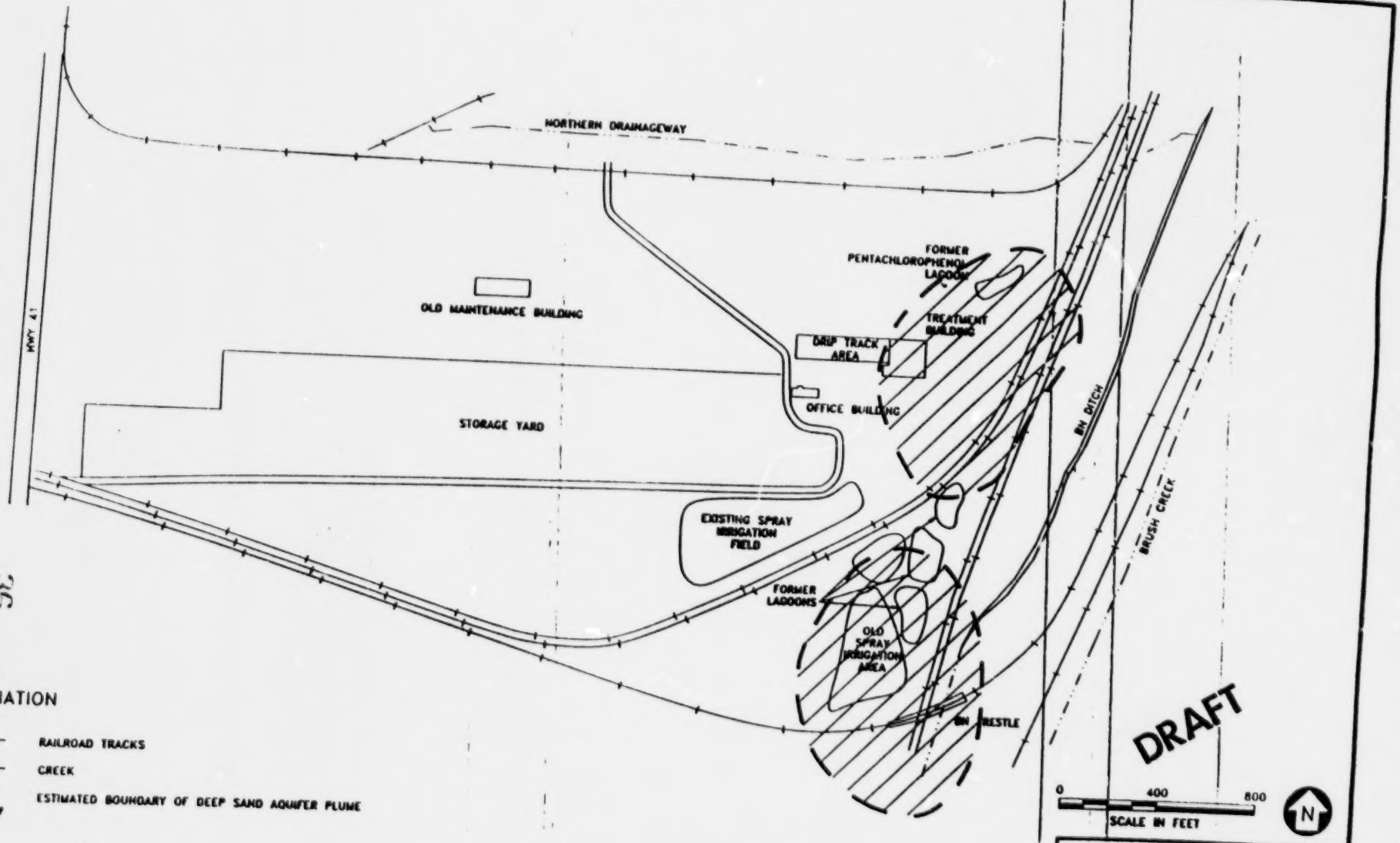
John Mathes & Associates, Inc.

SHALLOW TILL AQUIFER GROUNDWATER PLUMES

BURLINGTON NORTHERN RAILROAD GALESBURG, ILLINOIS

FIGURE 5



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PLANATION

RAILROAD TRACKS

CREEK

ESTIMATED BOUNDARY OF DEEP SAND AQUIFER PLUME

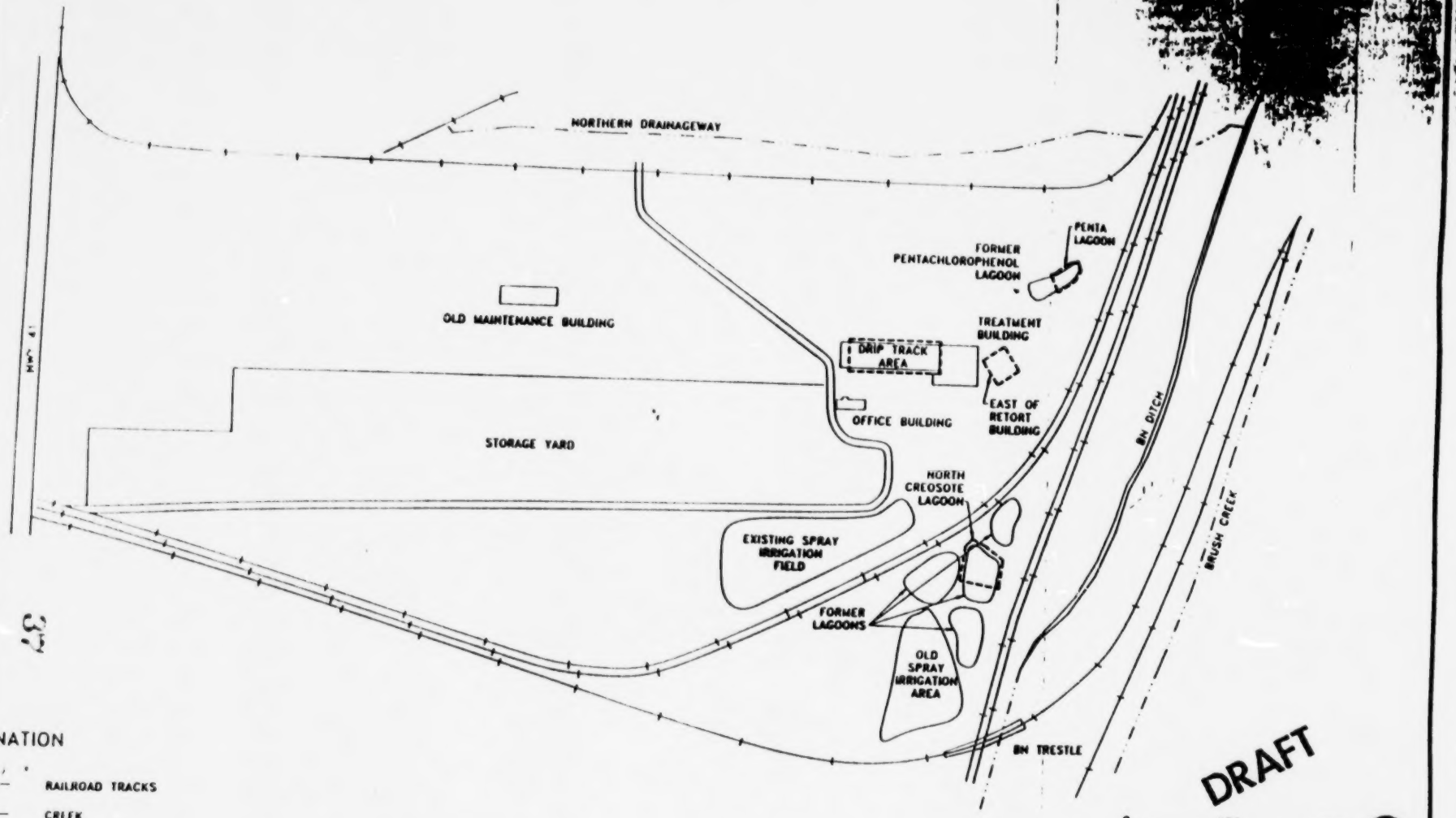
may modified from Environmental Science and Engineering, Inc., 1985

John Mathes & Associates, Inc.

DEEP SAND AQUIFER GROUNDWATER PLUMES

BURLINGTON NORTHERN RAILROAD GALESBURG, ILLINOIS 12683017

FIGURE 6



ANATION

RAILROAD TRACKS

CREEK

APPROXIMATE SOURCE REMOVAL AREAS

DRAFT

0 400 800

SCALE IN FEET

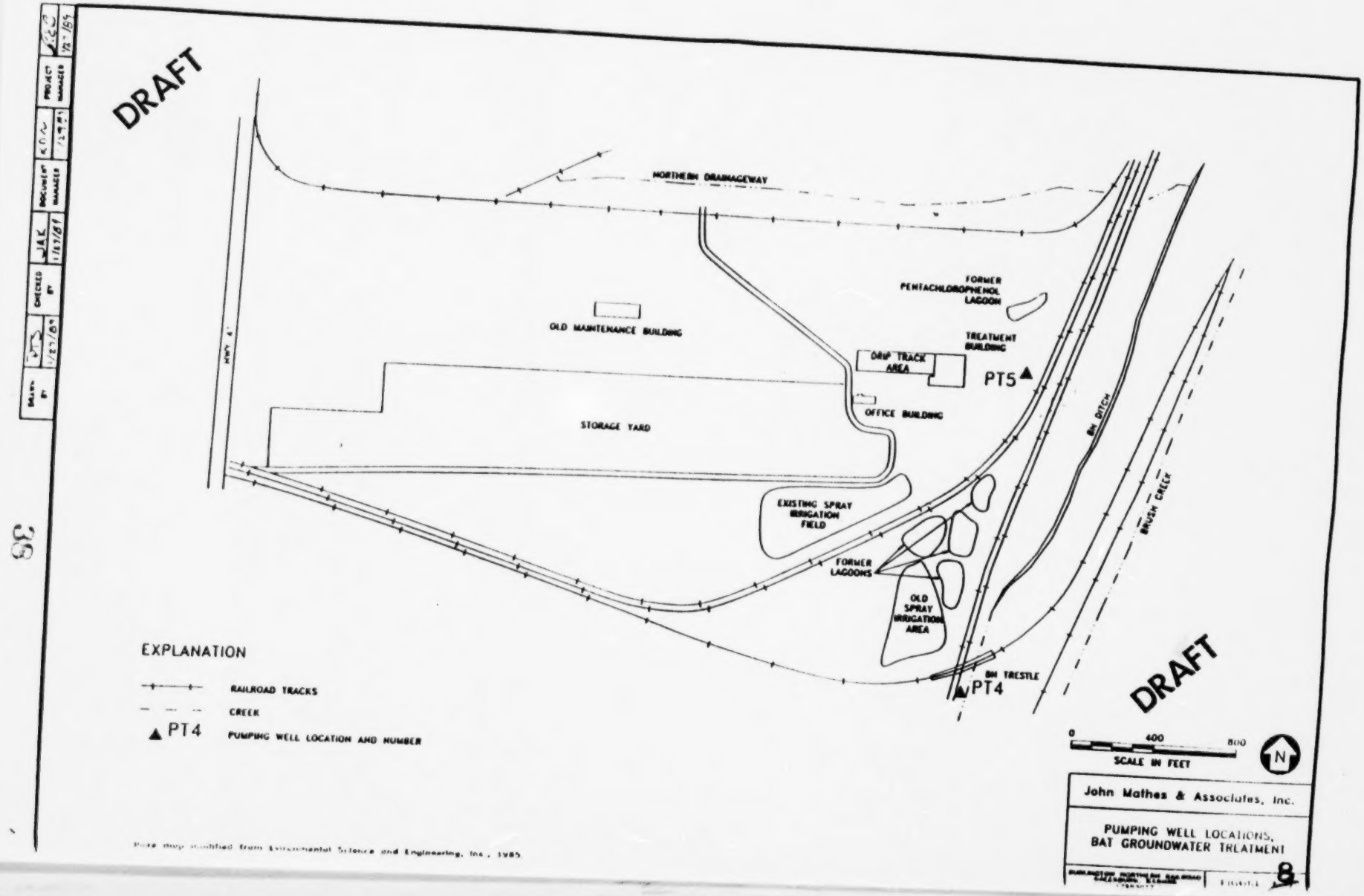
N

John Mathes & Associates, Inc.

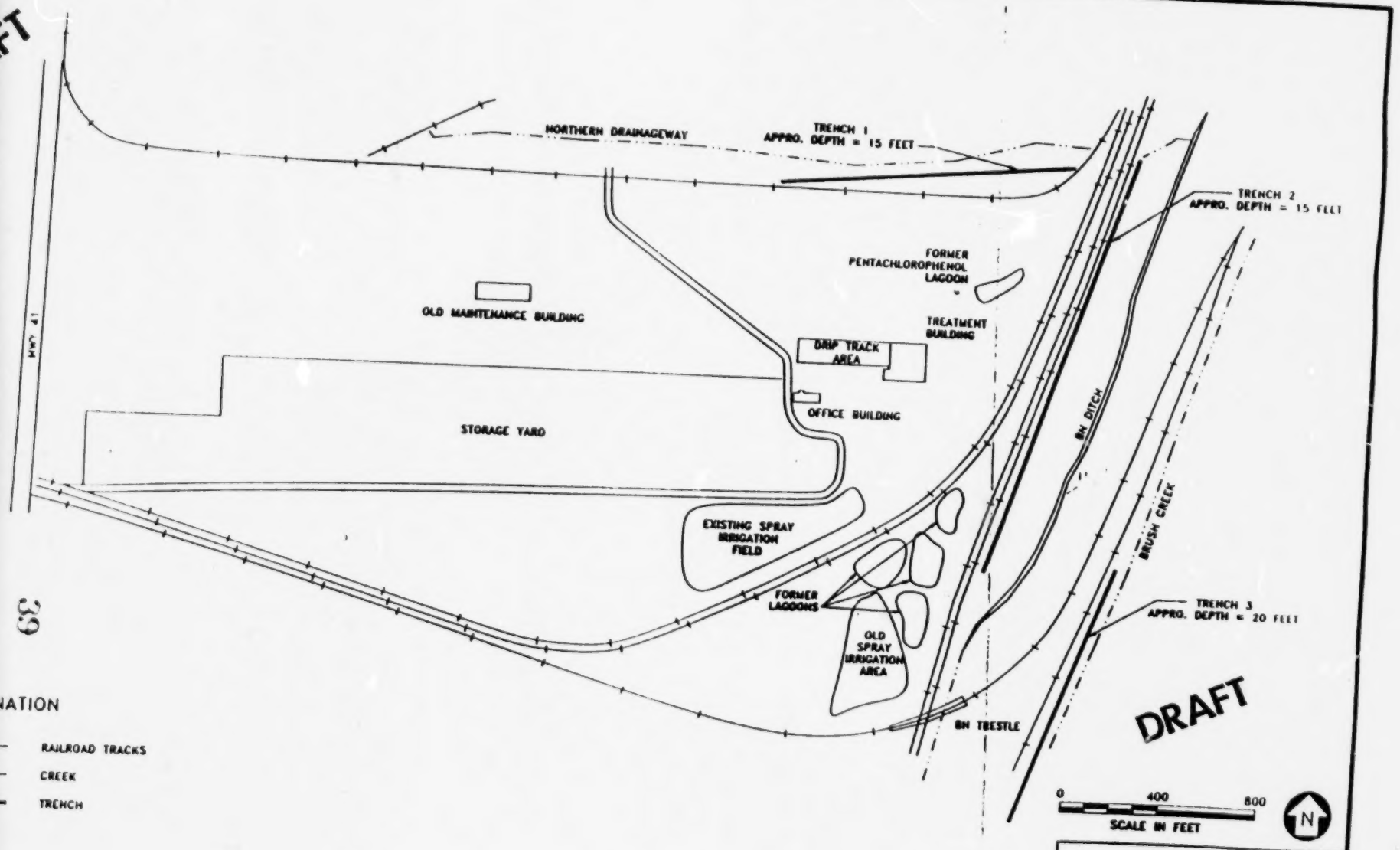
LOCATIONS OF SOURCE REMOVAL AREAS

BURLINGTON NORTHERN RAILROAD

FIGURE 7



Base map modified from Environmental Science and Engineering, Inc., 1985



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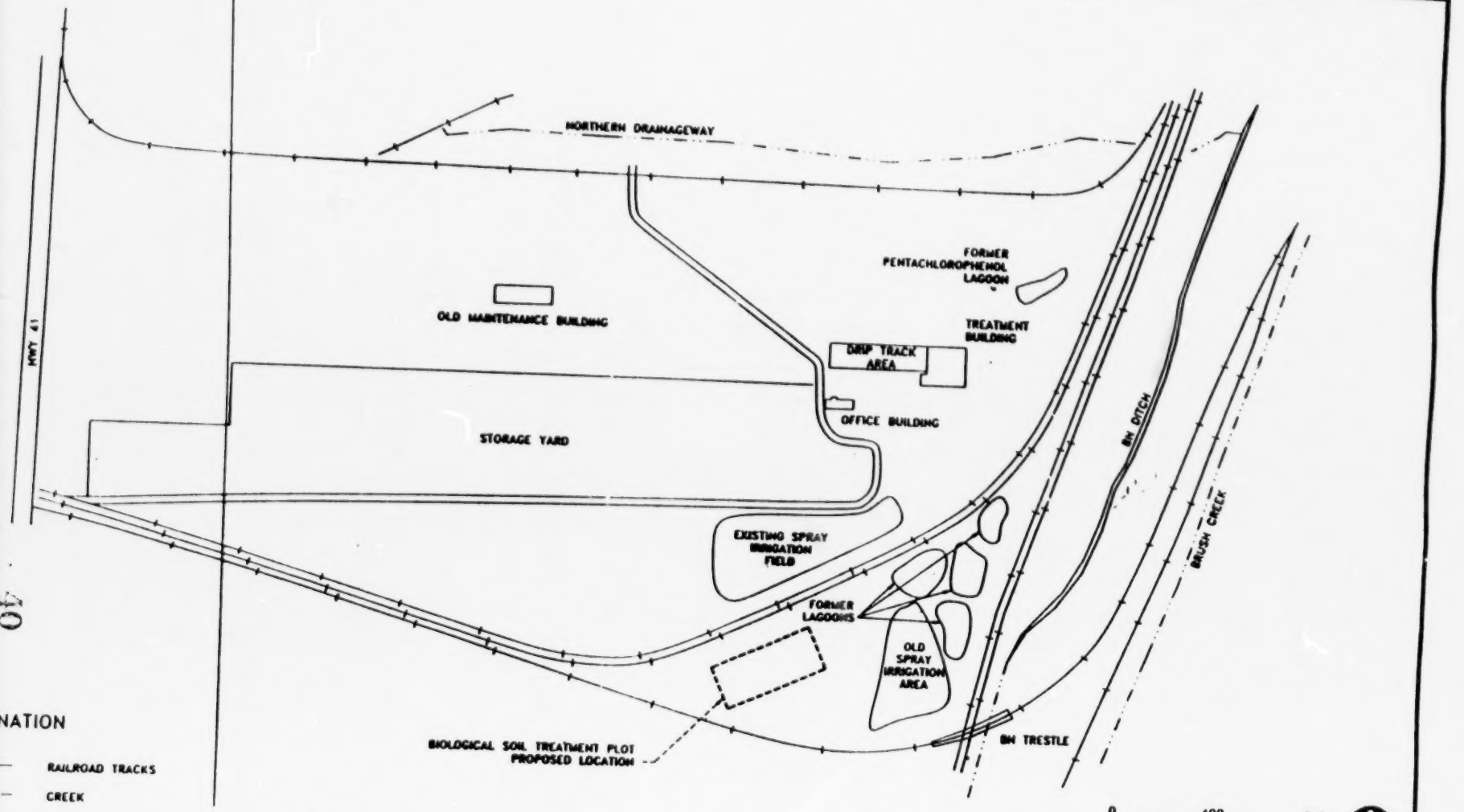
ANATION

RAILROAD TRACKS

CREEK

TRENCH

modified from Environmental Science and Engineering, Inc., 1985.



ap modified from Environmental Science and Engineering, Inc., 1985.

Table 1 - History of Onsite Waste Disposal, Koppers Galesburg Site

Site Number	Approximate Period of Use	Activity
J	1907-1966	Slurry lagoon that received discharge from the Lake Bracken water treatment plant.(WASTE EXCAVATED IN 1985 FROM BM SLURRY P IS CURRENTLY STORED ON-SITE IN GONDOLA CARS AND ON TARP IN OLD SPRAY FIELD AREA)
L&M	1935-1975	Originally may have been lime sludge lagoons. Creosote wastewater was contained in these lagoons from approximately 1963-1975.
K	1935-1970	Lime sludge lagoon. Temporarily held creosote wastewater in 1970 when sites L&M were found to be leaking.
N	1935-1976	Originally a lime sludge spreading area, this became the original spray field for creosote wastewater from 1974-1976.
I	1966-1974	Originally used for cooling water. Used for disposal of wastewater containing pentachlorophenol from 1971 to 1974. Although no longer in use, standing water is present.
M	1975-1986	Former spray field for plant wastewater.
R		Interceptor Ditch
X		Waste Pile , moved to creosote lagoons in mid 1980s.

* These areas were identified as potential RCRA "units" in the facility Management Plan.

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Table ~~1~~ 2

CHRONOLOGY

GALESBURG WOOD-TREATING FACILITY SITE

Date	Activity Description
03-Mar-87	ESE issues Draft FS dated 27-Feb-87.
01-Apr-87	IEPA issues initial IEPA/USEPA comments (66) on Draft FS.
01-May-87	ESE issues ESE, BNRR, and Koppers' collective itemized responses to initial IEPA/USEPA comments.
27-May-87	Technical meeting at IEPA to discuss Draft FS comments. The main discussion topics were: - duration of groundwater remediation, - treatment technologies for contaminated soil and groundwater, and - quantities of soil to be remediated and IEPA's interest in establishment of soil cleanup criteria.
05-Jun-87	IEPA issued second round of comments on the Draft FS.
01-Jun-87	Meeting at ESE (St. Louis) to discuss groundwater model.
16-Jun-87	Presentation on biological treatment of contaminated soils was made at IEPA by Keystone and ReTec.
26-Jun-87	Keystone issued responses to consent order comments issued by IEPA 01-Apr-87.
20-Jul-87	ESE received preliminary summary of IEPA's survey of surface water use by Lake Bracken residents.
21-Aug-87	ESE submitted a supplemental report to IEPA, IOAG, and USEPA detailing the results of additional modeling of the dynamics of the migration of contaminants from the lagoon source area into the shallow till aquifer, deep sand aquifer, and the interceptor trenches.
30-Sep-87	ESE submitted letter requesting changes to groundwater monitoring program.
06-Oct-87	IEPA responded formally to request for changes to groundwater monitoring program. Approved elimination of Wells 21, 107A, and 105 and change in sampling frequency from quarterly to semiannually.
04-Nov-87	Meeting at IEPA with representatives from IEPA, IOAG, USEPA, BNRR, Koppers, ReTec, and ESE wherein agencies presented their plan for remediation of the site.
13-Nov-87	Test pit survey conducted on site to evaluate the characteristics of contaminated soils within the former creosote and penta lagoon areas and evaluate various source removal strategies. Eleven samples were collected from eight test pits.
04-Jan-88	A response to IEPA, IOAG, and USEPA's 04-Nov-87 plan for remediation was submitted to the agencies by ESE. A report presenting the results of the test pit survey was submitted for review by IEPA, IOAG, and USEPA by ESE.
20-Jan-88	A meeting was held between the agencies and the PRPs to discuss approaches to remediation of the site. Disagreement remained on soil removal criteria. The PRPs agreed to:

Table 2, Continued

CHRONOLOGY

GALESBURG WOOD-TREATING FACILITY SITE

Date	Activity Description
	- model reinjection scenarios for the shallow till and deep sand aquifers, - evaluate the ability of the Galesburg POTW to treat the proposed discharge from the extraction trenches, - evaluate the sensitivity of remedial costs, soil volume removals, and risk factors to changes in soil removal criteria, - prepare counterproposal to toxicity testing of biological treatment, and - prepare financial assurance proposal.
15-Mar-88	A meeting was held between the agencies and PRPs to discuss remediation alternatives. The PRPs presented new groundwater modeling work which concluded that source removal and reinjection had insignificant impact on groundwater remediation timing. The PRPs presented ARARs interpretation. PRPs agreed to reevaluate endangerment assessment based on results of Brush Creek and Lake Bracken studies.
22-Mar-88	Public meeting in Galesburg concerning Lake Bracken.
26-Apr-88	Meeting in Springfield between the agencies and PRPs to discuss groundwater, source removal, biological testing, Brush Creek and Lake Bracken risk assessment, and financial assurance issues.
May-88	Keystone issued two reports: Evaluation Treatment System's Capacity (Keystone, 1988a), and Biological Degradation of Wood Treating Chemicals of Interest (Keystone, 1988b).
02-May-88	COT/CROPA cleanup levels sent to PRPs.
09-May-88	During this week, samples from 6 private wells were collected and split with IEPA.
10-May-88	Additional biological samples were collected from Lake Storey and Lake Bracken and split with IEPA.
01-Jun-88	Aquifer testing began during this month.
27-Jun-88	Meeting with IEPA to discuss test plot design.
01-Jul-88	During July, a summary of the April 1988 Steagall landfill surface, sediment, and leachate sampling results was forwarded to IEPA by the PRPs and ESE received IEPA's results for this same sampling event.
05-Aug-88	Met with IEPA on site to present practicality of visual criteria for source removal, to locate test plot, and to obtain samples for the test plot. Mathes provided draft visual criteria guidance document to IEPA.
08-Aug-88	Mathes met with Galesburg Sanitary District to discuss acceptance of groundwater.
01-Sep-88	During September, the PRPs issued the aquifer test report for agency use.
12-Sep-88	During this week, PRPs attempted a trench test, but test was impeded because of low groundwater elevations in the till unit.
19-Sep-88	During this week, background samples were collected from the Galesburg Sanitary District treatment plant.

Table 2, Continued

CHRONOLOGY

GALESBURG WOOD-TREATING FACILITY SITE

Date	Activity Description
22-Sep-88	PRPs met with IEPA and IOAG in Springfield to discuss progress. Reached agreement in principle on visual criteria.
11-Oct-88	PRPs met with IEPA, IOAG, and USEPA in Springfield. Major topic biomonitoring.
20-Oct-88	Issued Keystone preliminary test plot drawings.
02-Nov-88	Mathes met with IEPA and USEPA in Springfield to discuss preparation of the FS addendum and schedule. Notified IEPA that proposed test plot location may be flawed.
07-Dec-88	PRPs met with IEPA, USEPA, and IOAG in Springfield to continue negotiations. Results of limited-success trench test were issued by Mathes. Confirmed that proposed test plot location appears to be technically impractical, due to high groundwater elevations. Committed to check water levels in northwest corner of the site.
13-Dec-88	Mathes issued POTW background sampling report.
20-Dec-88	Results of PRP-collected fish samples from Lakes Storey and Bracken were issued to IEPA by Mathes.
20-Dec-88 to 22-Dec-88	Installed four monitoring wells in northwest corner of site to investigate suitability of area for use as a biological soil treatment test plot location.
10-Jan-89	PRPs met with IEPA and IOAG in Springfield to discuss biological soil treatment test plot monitoring.
31-Jan-89	Issued Best Available Technology (BAT) report discussing groundwater treatment and disposal options.
08-Feb-89	PRPs met with IEPA in Springfield to discuss all remaining site issues.
23-Feb-89	Mathes issued Draft 2 of FS Addendum to USEPA, IEPA, IAOG, BNRE, and Beazer Materials and Services for simultaneous review.
03-Mar-89	IEPA issued proposal for evaluation of the performance of biological treatment of site soils.
03-Mar-89	PRPs issued Addenda to Endangerment Assessment.
13-Mar-89	Mathes issued letter to Hunter/ESE describing resolution of comments on Draft FS. Copies were sent to IEPA, USEPA, IOAG, and PRPs.
30-Mar-89	Hunter/ESE issued Draft Final Feasibility Study Report.
07-Apr-89	Mathes met with IEPA and USEPA to discuss agency comments on Draft 2 of the FS Addendum.
11-Apr-89	PRPs met with IEPA, USEPA, and IOAG to continue working toward resolution of issues.
13-Apr-89	Teleconference between Mathes, IEPA, and USEPA to discuss the agency's comments on Draft 2 of the FS Addendum

ORIGINAL FS

- DRAFT 2 -

Table 3

ALTERNATIVES EVALUATED BY ESE

GALESBURG WOOD-TREATING FACILITY SITE

ESE Alternative Number	Treatment Technologies Categorized by Environmental Medium		
	Soil	Groundwater	Lime Sludge
2A	Excavation On-site landfill	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	On-site landfill
2B	Excavation On-site incineration Backfill Ash	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Backfill
2C	Excavation Land treatment	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Biological soil treatment as amendment to soil
3A	Excavation On-site incineration Backfill Ash	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Backfill
3B	Excavation On-site landfill	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	On-site landfill
3C	Excavation Biological soil treatment	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Biological soil treatment as amendment to soil

Note: These alternatives are not evaluated in this FS addendum.

Table 3, Continued

ALTERNATIVES EVALUATED BY ESE

GALESBURG WOOD-TREATING FACILITY SITE

ESE Alternative Number	Treatment Technologies Categorized by Environmental Medium		
	Soil	Groundwater	Lime Sludge
4A	Excavation Biological soil treatment Grade and cover	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Backfill
4B	Excavation Biological soil treatment	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Backfill
4C	Excavation Biological soil treatment Caps - Multimedia - Concrete	Deep Aquifer: Extraction NPDES discharge Shallow Aquifer: Interceptor trenches Treatment at POTW	Backfill
5A	No action	No action	No action

Note: These alternatives are not evaluated in this FS addendum.

Table ~~2~~ 4

ALTERNATIVES EVALUATED IN THIS ADDENDUM

GALESBURG WOOD-TREATING FACILITY SITE

Alternative Number	Soil	Groundwater	Lime Sludge
1	No action	BAT*	No action
2	Biological	BAT*	Gondola cars: Biological soil treatment Old spray field area: Amendments
3	On-site incineration	BAT*	Gondola cars: On-site incineration Old spray field area: Backfill
4	On-site landfill	BAT*	Gondola cars: On-site landfill Old spray field area: Backfill
5	Capping	BAT*	Capping
6	No action	No action	No action

* Best available technology includes:

- deep sand aquifer - direct discharge to POTW;
- north till aquifer - direct discharge to POTW; and
- south till aquifer - oil/water separation and biological aeration prior to discharge to POTW.

TABLE 5
CLEAN-UP GOALS

DRAFT

SELECTED REMEDIES MEDIA:	CHEMICAL	REMEDIATION GOALS
Ground Water	Carcinogenic PNA	$2.9X10^{-6}$ mg/l; Human Health
	Phenols	0.1 mg/l; Human Health
	PCP	.2 mg/l; Human Health
	Asbestos	$7.1X10^{-6}$ fibers/liter; PMCL
Soil Excavation	Carcinogenic PNA Total PNA Phenols PCP	Excavation based on a visual criteria with a 6" buffer zone to a depth that ensures effective mitigation of contaminants to the ground water and that ensures attainment of health based levels after remediation.
Treated Soils	Carcinogenic PNAs Total PNAs Phenols PCP	Cleanup Goals are based on reduction of toxicity demonstrated by bioassays.

Direct Discharge to Surface Water

Benzo(a)pyrene	0.5	IWQS (2)
Benzo(a)anthracene	1.0	IWQS
Naphthalene	790	IWQS
Phenanthrene	10	IWQS
Acenaphthene	60.8	IWQS
Anthracene	2.3	IWQS
Fluoranthene	398	IWQS
Phenols	100	IWQS
Pentachlorophenol	300	Effluent
pH (standard units)	19	IWQS
	6.5-9.0	IWQS

Indirect Discharge to Galesburg POTW ** PARAMETERS TO BE DEVELOPED BY THE GALESBURG POTW AS NECESSARY IN 40 CFR 403.

Oil and Grease	100,000	CWA Section 307
Copper	5,000	CWA Section 307
Chromium	4,000	CWA Section 307
Arsenic	4,000	CWA Section 307

Air Emissions

Organic Material	3.6 kg/hr	35 IAC 215.301

Air Emissions From Incinerators

Particulate Matter	229 mg/m^3 corrected to 12% CO_2	35 IAC 212.181
Carbon Monoxide	550 ppm corrected to 50% excess air	35 IAC 216.141

---

(1) MCL scheduled for proposal June 1989.
(2) Whenever a water quality standard (IWQS) is more restrictive than its corresponding effluent standard (designated as "Effluent") then the effect of mixing of the effluent with the receiving waters will be considered. The water quality standards do not apply during periods when flows are less than the average minimum seven-day low flow, which occurs once every ten years (see Sections 302.102 and 302.103 of 35 IAC Subtitle C).

AWQC Ambient Water Quality Criteria.
IWQS Illinois Water Quality Standard.
kg/hr kilograms per hour.
mg/m^3 Milligrams per cubic meter.
PMCL Proposed Maximum Contaminant Level.
ppm Parts per million.
ug/L Micrograms per liter.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

BACKUP FOR TABLE 5

1/12

MEMORANDUM

DATE: December 6, 1988

TO: Tim Kluge/COT

FROM: Jim O'Brien By: Thomas C. Hornshaw

SUBJECT: Updated Naphthalene and Anthracene Cleanup Objectives

During OCS's review of Koppers' comments on the Generic PNA Cleanup Guidance memo of February 8, 1988 it has come to our attention that new information is available for naphthalene and anthracene. This information enables us to propose a cleanup objective for naphthalene for the protection of human health and to update the cleanup objective for anthracene for protection against aquatic toxicity.

Naphthalene - In the February 8, 1988 memo it was stated that inadequate toxicity data exists for naphthalene to recommend a cleanup level for protection of human health. The August 11, 1988 update of the risk characterization tables of the Superfund Public Health Evaluation Manual contains an Acceptable Intake - Chronic (AIC) value for naphthalene of 0.4 mg/kg/d, based on the Health Effects Assessment (HEA) for naphthalene. This value has been used to calculate an acceptable lifetime intake from water, using standard USEPA techniques and assumptions for body weight (70 kg) and drinking water ingestion rate (2 l/d). The calculated acceptable lifetime intake from drinking water is:

$$\frac{0.4 \text{ mg/kg/d} \times 70 \text{ kg}}{2.0 \text{ l/d}} = 14.0 \text{ mg/l.}$$

This value assumes that there is no contribution of naphthalene to the daily intake from other routes of exposure. However, it has been well documented that exposure to volatile compounds in drinking water can be increased by the inhalation route and possibly the dermal route as well. Using USEPA's standard assumption of 20% of the total exposure coming just from drinking water, the acceptable lifetime concentration of naphthalene in drinking water is:

$$20\% \times 14.0 \text{ mg/l} = 2.8 \text{ mg/l} = 2{,}800 \text{ µg/l.}$$

Anthracene: OCS has received a paper entitled "The photoenhanced toxicity of anthracene to juvenile sunfish (Lepomis spp.)" (James T. Oris and John P. Giesy, Jr. Aquatic Toxicology 6:133-146, 1985) in which the toxicity of anthracene to several species of juvenile sunfish was assessed under conditions of simulated natural sunlight. This research was conducted to examine the potential for enhanced toxicity of anthracene, a well-known phototoxic compound, under simulated natural light versus standard laboratory light conditions. The study was reviewed by OCS to determine its degree of reliability using the rating criteria of the AQUIRE database, and was found to have the most reliable rating of 1. The reported 96-hour LC_{50} value for hatchery-raised juvenile sunfish under simulated natural light conditions was 2.78 µg/l. This value is used as the 96-hr TLm in the proposed revision of the aquatic toxicity value, incorporating the standard 1/10th safety factor for chronic toxicity protection. The proposed value for anthracene is 0.3 µg/l. This value should replace the currently-referenced value of 2.3 µg/l, and the new value for the total of non-carcinogenic PNAs (which is based on the most toxic individual PNA in the group) should likewise be changed to 0.3 µg/l.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

3/12

DATE: November 1, 1988

TO: Kurt Neibergall, RPMS/DLPC

FROM: Tim Kluge, Permits/DWPC TK

SUBJECT: NPDES Limits for Koppers Discharge

During the October 11, 1988 negotiation meeting with Koppers, we discussed potential effluent limits for discharges of groundwater to a small unnamed tributary of Cedar Creek. The discharge point was reported to be approx. 1½ miles upstream of the confluence with Cedar Creek. The seven day-ten year low flow of the stream is assumed to be zero.

With two modifications, the preliminary limits shown in my April 6, 1988 memo remain applicable. A typographical error in the acenaphthene limit has been corrected. Also, OCS has suggested that the additive nature of toxicity of the individual PNA's should be addressed. This has been done by the addition of a whole effluent toxicity limit. The effluent limits, therefore, would be as follows:

Parameter	Limit* (ug/l exc. as noted)
Total phenols	100
Pentachlorophenol	2
Benzo(a)pyrene	0.5
Benzo(a)anthracene	1
Naphthalene	230
Phenanthrene	10
Acenaphthene	60.8
Anthracene	2.3
Fluoranthene	398
pH	6.5-9.0 (std. units)
BOD	20 mg/l (10 mg/l mo. avg.)
Suspended Solids	24 mg/l (12 mg/l mo. avg.)
NOEC**	≥100% effluent

*Daily maximum concentration
**No Observable Effect Concentration based on a chronic effluent toxicity test

These limits should still be considered subject to modification pending the results of the BAT study Koppers is undertaking.

TRK:md

cc: Tom McSwiggin
NPDES File
Planning Section/DWPC

RECEIVED
NOV 4 1988
IEPA-DLPC

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

KDN
FINAL
3/12

DATE: February 8, 1988

TO: CPRC

FROM: COT

SUBJECT: Generic PNA Cleanup Guidance

Due to continuing uncertainty concerning what are appropriate cleanup objectives for polynuclear aromatic hydrocarbons (PNAs) under various environmental scenarios, OCS has reviewed federal documents, review articles, and recent studies in the literature in order to compile generic PNA cleanup guidance for certain of these environmental scenarios. This memo presents a brief review of PNA toxicity, proposed cleanup guidance for specific scenarios, and the reasoning for the guidance for those scenarios. The user of this material should keep in mind that a resource person is available in OCS for further information and guidance on PNAs.

PNA Toxicity

PNAs are products of the incomplete combustion of carbon-containing material. As a result of natural and anthropogenic combustion sources, PNAs are nearly ubiquitous in the environment. They have been reported in soils, waters, sediments, air, and biota in numerous studies, at generally low (sub-ppm) concentrations, from around the world. Localized areas of high "background" PNA concentrations can be found near more-or-less continuous combustion sources such as coal-burning plants, major roadways, railroad yards, etc. Ambient PNA concentrations also reflect nearby population density, with urban samples generally containing more PNAs than rural.

The primary toxicological endpoint of concern with PNA exposures is the initiation and growth of tumors. Several individual PNAs have been shown in laboratory tests to be among the most potent carcinogens known, capable of producing tumors in some laboratory animals from a single exposure to microgram quantities of the PNA. Many animal and a few plant species have been shown to have carcinogenic or teratogenic responses to individual PNAs and mixtures of PNA compounds in the laboratory. Several studies have shown greatly increased incidences of tumors or birth defects in wild populations of certain species living in contact with media containing high (tens to hundreds of ppm) levels of PNAs. PNAs were the first group of compounds shown to be epidemiologically associated with an increased tumor incidence in humans, having been shown by Potts in 1775 to be associated with an increased incidence in scrotal tumors among chimney sweeps. Since then, numerous epidemiological studies have shown a clear association between tumor incidence and exposure to PNA-containing mixtures such as soots, coal tars, creosoting mixtures, and certain oils. More recent work has shown that many PNA compounds (even if they are not carcinogenic themselves) are capable of promoting the carcinogenic activity of another cancer-causing compound (including the carcinogenic PNAs). For instance, the non-carcinogens fluoranthene, pyrene, benzo(e)pyrene, and benzo(g,h,i)perylene, when applied simultaneously with the carcinogen benzo(a)pyrene, resulted in an increase in the total number of tumors when compared to only benzo(a)pyrene application.

In addition to the tumor-producing action of the PNAs, other toxicological endpoints of concern have been associated with PNA exposures. Several

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of the lower molecular weight PNAs (which are slightly water-soluble) are acutely toxic to aquatic life or produce deleterious effects at low concentrations. PNA mixtures have been shown to be immunotoxic in several species of aquatic and terrestrial life, and have been shown to impair reproductive capabilities in aquatic and terrestrial species as well. PNAs have been shown to be potent inducers of metabolizing enzymes, and thus are capable of upsetting the normal metabolic pathways of endogenous and exogenous substances within an organism.

PNA Cleanup Objective Guidance

For scenarios where prolonged human exposure is currently or potentially possible, such as sites where surface waters or groundwater is or may be used for drinking water, where consumption of contaminated aquatic organisms is a possibility, or where direct contact with contaminated soils is possible, it is recommended that cleanup objectives be based on Ambient Water Quality Criteria (AWQCs). COT's recommendation is to treat separately the carcinogenic PNAs, the non-carcinogenic PNAs, and naphthalene. Parameter values will be specified for protection against consumption of contaminated water, contaminated aquatic organisms, or contaminated water plus aquatic organisms, as appropriate for the specific site's known or projected water use patterns.

For the carcinogenic PNAs, the recommended cleanup guidance is the 10^{-5} or 10^{-6} risk level from the AWQC for benzo(a)pyrene for the protection of consumption of the appropriate contaminated medium (water, aquatic organisms, or water plus aquatic organisms). Specifically, the sum of the carcinogenic PNAs should not exceed the appropriate AWQC risk level concentration in the medium to be protected.

For the non-carcinogenic PNAs (excluding naphthalene) COT guidance is provided for two cleanup scenarios depending on whether carcinogenic PNAs are also present in the medium to be protected or not. These are based on the AWQC for fluoranthene. If no carcinogenic PNAs are detected at the most sensitive detection limit practicable, the recommendation is the AWQC for fluoranthene to protect against consumption of the appropriate contaminated medium. However, if any carcinogenic PNAs are detected, then the appropriate AWQC value for fluoranthene will incorporate a safety factor of ten to protect against the additive and/or cocarcinogenic effects of the non-carcinogenic PNAs on the carcinogenic PNAs. In either case, the sum of the concentrations of the non-carcinogenic PNAs should not exceed the appropriate AWQC level. For naphthalene, inadequate toxicity data exists to recommend a level for protection of human health. Therefore, the recommendation for naphthalene for all scenarios is based on aquatic species toxicity from the AWQC for naphthalene.

For scenarios where prolonged human contact is not expected, the recommendations are based on aquatic toxicity data for those PNAs for which adequate aquatic toxicity data are available. Due to the limited aquatic toxicity data base for most of the PNAs, values for the carcinogenic PNAs and non-carcinogenic PNAs are based on the most toxic components of the group (benzo(a)pyrene and anthracene, respectively). The guidance is for the sums of the carcinogenic and non-carcinogenic PNAs not to exceed one-tenth the acute toxicity level for the most toxic member of the group in the medium to be protected.

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COT recognizes that individual components of PNA mixtures display a range of environmental mobilities and persistence, and that different media at the same site may contain different mixes of the PNAs. Therefore, it may be appropriate at certain sites for recommendations to be "tailored" to each medium at a site, depending on the nature (and quality) of the analytical results. The following tables summarize the human health and aquatic toxicity information gathered to date for the priority PNAs. The "generic" recommendations for waters and soils are listed at the bottom of Tables 1 and 2, respectively. The values in Table 2 for soils incorporate a 20-fold dilution factor, as in the TCLP test. A formula to calculate site-specific cleanup levels for sediments is presented in Table 3 with examples using 1% and 10% total organic carbon contents in sediment.

TCH/psf

Table 1. Water Quality Guidance for Priority PNAs.

Priority PNA	CAG[1] Rank	AWQC[2] (µg/l) Fish & Water	Fish	Water	Chronic Aquatic	1/10 TLm-96 hr (µg/l)	PQL[3] (µg/l)
Acenaphthene		ND[4]	ND[4]	ND[4]	520	60.8	18
Acenaphthalene							10
Anthracene						2.3	6.6
Benzo(a)anthracene	B2					1.0	0.13
Benzo(a)pyrene	B2	.0028[5]	.0311[5]	.0031[5]	ND[4]	0.5	0.23
Benzo(b)fluoranthene	B2						0.18
Benzo(g,h,i)perylene							0.76
Benzo(k)fluoranthene	D						0.17
Chrysene	B2						1.5
Dibenzo(a,h)anthracene	B2						0.3
Fluoranthene	C	42	54	200	ND[4]	398	2.1
Fluorene							2.1
Indeno(1,2,3-c,d)pyrene	C						0.43
Phenanthrene	D					10	6.4
Pyrene							2.7
Carcinogenic PNAs		.0028[5]	.0311[5]	.0031[5]		0.5[7]	---

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Table 1. Water Quality Guidance for Priority PNAs.
CONTINUED

Priority PNA	CAG[1] Rank	AWQC[2] (µg/l) Fish & Water	Fish	Water	Chronic Aquatic	1/10 TLm-96 hr (µg/l)	PQL[3] (µg/l)
Non-Carcinogenic PNAs (no carcinogenic PNAs detected)		42	54	200		2.3[7]	---
Non-Carcinogenic PNAs (other carcinogenic PNAs detected)		4.2	5.4	20.0		2.3[7]	---
Naphthalene		ND[4]	ND[4]	ND[4]	NA[6]	230	10

Table 2. Total Soil Concentration Cleanup Guidance for Priority PNAs.

Priority PNA	CAG[1] Rank	AWQC[2] (µg/kg) Fish & Water	Fish	Water	Chronic Aquatic	1/10 TLm-96 hr (µg/kg)	PQL[3] (µg/kg)
Acenaphthene		ND[4]	ND[4]	ND[4]	10,400	1216	1200
Acenaphthalene							660
Anthracene							660
Benzo(a)anthracene	B2					46	8.7
Benzo(a)pyrene	B2	0.056[5]	0.622[5]	0.062[5]	ND[4]	20	15
Benzo(b)fluoranthene	B2					10	12
Benzo(g,h,i)perylene							51
Benzo(k)fluoranthene	D						11
Chrysene	B2						100
Dibenzo(a,h)anthracene	B2						20
Fluoranthene	C	840	1080	3760	ND[4]	7960	140
Fluorene							140
Indeno (1,2,3-c,d)pyrene	C						29
Phenanthrene							660
Pyrene							180
Carcinogenic PNAs		0.056[5]	0.622[5]	0.062[5]		10^7	---

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Table 2. Total Soil Concentration Cleanup Guidance for Priority PNAs.
CONTINUED

Priority PNA	CAG[1] Rank	AWQC[2] (µg/kg)				1/10 TLm-96 hr (µg/kg)	PQL[3] (µg/kg)
		Fish & Water	Fish	Water	Chronic Aquatic		
Non-Carcinogenic PNAs (no carcinogenic PNAs detected)		840	1080	4000		46[7]	---
Non-Carcinogenic PNAs (other carcinogenic PNAs detected)		84.0	108.0	400.0		46[7]	---
Naphthalene		ND[4]	ND[4]	ND[4]	NA[6]	4600	660

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Table 1 & 2 Footnotes

19/12

1 USEPA's Carcinogen Assessment Group: B2 signifies a compound has been shown to be carcinogenic in laboratory animals, but there is inadequate evidence for human carcinogenicity (= probably human carcinogen); C signifies limited evidence of carcinogenicity in animals but an absence of data in humans; D signifies inadequate animal evidence of carcinogenicity.

2 Ambient Water Quality Criteria for the protection of consumption of aquatic organisms plus water, for consumption of aquatic organisms only, for consumption of water only, and the protection against chronic aquatic toxicity.

3 Lowest Practical Quantitation Limit for analytical methods listed in SW 846.

4 Not determined; insufficient data to permit establishing a criterion.

5 Value listed corresponds to a 10^{-6} risk level. Values for soil correspond to a 10^{-6} risk level multiplied by a 20-fold dilution factor as specified in TCLP test.

6 Not applicable; criterion developed for saltwater species, inadequate data for freshwater species criterion.

7 Aquatic toxicity values for total carcinogenic and non-carcinogenic PNAs reflect values for the most toxic of the individual carcinogenic (= B2) and non-carcinogenic PNAs.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

DATE: June 19, 1987

11/12

TO: CROPA

FROM: COT/Sharron LaFollette SEL

SUBJECT: Galesburg Koppers Cleanup Objectives

On 11 June 1987 COT reviewed information regarding the proposed remedial alternative at the railroad crosstie treating facility of Koppers Company Inc. south of the city of Galesburg. This site has been evaluated under CERCLA and placed on the US EPA's National Priority List. To date Koppers has completed the Remedial Investigation (RI), Endangerment Assessment (EA), and Feasibility Study (FS).

The remedial alternative suggested by Koppers focuses on groundwater management (deep and shallow aquifers) with an estimated 75 year reclamation time to reach the 10^{-6} excess unit health risk based on criteria for polycyclic aromatic hydrocarbons (PAHs). Koppers has proposed minimal source excavation and then only in drip track and storage pad areas located adjacent to the operating facility. The excavated soil would undergo biological land treatment on the southwest corner of the property. The drip track and storage pad areas would then be capped with concrete. The lagoon areas would not be excavated but would be backfilled and covered with a multi-media soil cap.

After careful review of data provided by Koppers and that collected during the Steagall landfill investigation, COT recommends quantitative, health-based cleanup objectives for water and soil. The water objectives apply to both the shallow and deep aquifers which are currently used by nearby residents and surface water which drains via Brush Creek to Lake Bracken from which some residents draw their water. The soil objectives apply not only to the drip track and storage pad areas, but also to lagoon areas, gondola car contents, and lime sludge piles. If the Agency agrees to the use of biological land treatment at the Galesburg Kopper site, COT also recommends that the soil objectives apply to the biological land treatment unit as a means for judging completeness of the biodegradation. COT also recommends that water objectives apply to any leachate collected from the biological land treatment unit.

Koppers remedial alternative focuses on the cleanup of PCP, phenols, and PAHs. Since stockpiled lime sludge is being considered for backfill in the lagoons and soil amendment for the biological land treatment unit, COT also recommends a pH objective to enhance revegetation.

The remedial alternative predicts a minimum groundwater cleanup time of 75 years. COT recommends that the cleanup objectives are reviewed every five years. If additional health information or cleanup objective guidance has been compiled, the cleanup objectives may be revised at this time.

CONCLUDES BACKUP FOR TABLE 5

12/12

Chemical	Water	Soil	Comments
PAH (excluding naphthalene)	.0028 µg/l	.0028 µg/l (TCLP)	US EPA Water Quality Criteria Based on 10^{-6} Risk Level
Phenols	1 µg/l	1 µg/l (EP Tox)	35 IAC 302.304
PCP	220 µg/l	220 µg/l (TCLP)	20% USEPA H.A. 9-30-85
naphthalene	230 µg/l	230 µg/l (TCLP)	1/10 TLm 96-hr
pH		6.5 - 9.0	

SEL/psf/039

* INITIAL OBJECTIVES — SUBSEQUENTLY REVISED

- DRAFT 2 -

Table ~~3~~ 4

ESTIMATED VOLUMES OF SOIL CONSIDERED FOR REMEDIATION

GALESBURG WOOD-TREATING FACILITY SITE

Location	Estimated Area (ft^2)	Estimated Depth (ft)	Estimated Volume (yd^3)
Penta Lagoon	7,500	3	830
North Creosote Lagoon	14,740	9	4,920
Drip Track Area	27,720	6	6,160
East of Retort Building	6,810	3	760
		Subtotal	12,660
		Swell Factor (20%)	2,532
		TOTAL	15,192

Note: These estimated soil volumes are considered for remediation as part of Alternatives 2, 3, and 4 only, AND WERE ESTIMATED FOR COST PURPOSES.

DRAFT

Table 3 ~~10~~ 7

SUMMARY OF COST ESTIMATES FOR ALTERNATIVES

GALESBURG WOOD-TREATING FACILITY SITE

Alternative	Total Construction and Implementation Cost	Annual O&M Cost	Present Worth
1 BAT groundwater treatment	$913,419	$168,912	$2,505,738
2 Biological soil treatment, BAT groundwater treatment	$2,684,155	$170,012	$4,286,844
3 On-site incineration, BAT groundwater treatment	$16,664,182	$170,012	$18,266,871
4 On-site landfill, BAT groundwater treatment	$3,574,755	$177,012	$5,243,432
5 Capping, BAT groundwater treatment	$1,261,315	$170,412	$2,867,774
6 No action	$74,784	$59,200	$632,857

NOTE:

The present worth calculation was performed according to the method shown in Appendix A at a discount rate of 10 percent over 30 years.

GALESBURG KOPPERS ENDANGERMENT ASSESSMENT ESE, DECEMBER, 1986. 1/2

* INCLUDES DATA FROM KOPPERS RI ONLY

KOPPERS.3/EA-HTB22.1.2
12/04/86

Table 8 Summary of Onsite Concentrations and Distribution of Koppers Indicator Chemicals

Indicator Chemical or Class	PCP Lagoon	Drip Track	Lagoon Areas[a]	Plant Area	Northern Drip Track Area	Existing Spray Field[a]
Soil Concentrations (ug/kg)						
PNAs						
Total Carcinogenic PNAs	41.8 - 469	35 - 6.4×10^5	ND - 1.9×10^6	4.2 - 3.9×10^4	4 - 31	7.41 - 3.6×10^4
Total Noncarcinogenic PNAs	348 - 2.4×10^4	2.1×10^3 - 6.5×10^6	ND - 1.4×10^7	7.0 - 6×10^5	10 - 39	1.2×10^3 - 2.8×10^4
Phenols	11 - 305	126 - 3×10^3	ND - 3.6×10^4	ND - 1.3×10^3	ND - 193	58 - 2.5×10^3
PCP	ND - 2.3×10^3	ND - 690	ND - 1.6×10^3	ND - 540	ND	ND - 38
Naphthalene	121 - 386	379 - 1×10^6	ND - 6.8×10^6	ND - 8.3×10^5	44 - 1,550	ND - 81
Dioxins						
Hexadioxins	0.0058	ND	NA	NA	NA	NA
Heptadioxins	0.112	ND	NA	NA	NA	NA
Octadioxins	0.207	ND	NA	NA	NA	NA
Furans						
Hexafurans	0.016	ND	NA	NA	NA	NA
Heptafurans	0.064	ND	NA	NA	NA	NA
Octafurans	0.232	ND	NA	NA	NA	NA
Ground Water Concentrations (ug/L)						
PNAs						
Total Carcinogenic PNAs						
Shallow Till	ND - 11.4	NA	ND - 4.6×10^5	ND - 0.95	ND - 1.0	ND
Deep Aquifer	ND - 0.16	NA	ND - 48	ND - 0.16	f	ND
Total Noncarcinogenic PNAs						
Shallow Till	ND - 843	NA	ND - 6.7×10^6	ND - 11	ND - 1.3×10^3	ND
Deep Aquifer	0.04 - 32	NA	ND - 3.4×10^3	ND	f	0.03 - 0.21
Phenols						
Shallow Till	ND - 780	NA	ND - 3.5×10^4	ND - 13	ND - 230	ND
Deep Aquifer	ND - 10	NA	ND - 160	ND	f	NA

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Table Summary of Onsite Concentrations and Distribution of Koppers Indicator Chemicals (Continued, Page 2 of 2)

Indicator Chemical or Class	PCP Lagoon	Drip Track	Lagoon Areas[a]	Plant Area	Northern Drip Track Area	Existing Spray Field[a]
PCP						
Shallow Till	ND - 3.2×10^3	NA	ND - 8.4×10^4	ND - 23.7	ND - 4×10^3	ND - 46.9
Deep Aquifer	ND - 1.3	NA	ND - 146	ND	†	ND
Naphthalene						
Shallow Till	ND - 1.5×10^4	NA	ND - 6.9×10^6	ND - 6.1	ND - 3×10^3	ND
Deep Aquifer	ND - 367	NA	ND - 5.7×10^3	0.25 - 0.58	†	ND - 0.23
Air Concentrations (ug/m^3)						
PNAs						
Total Carcinogenic PNAs	0.018	0.0098	ND	0.0021	NA	0.026
Total Noncarcinogenic PNAs	1.58	3.25	0.186	1.53	NA	1.567
Phenols	ND	ND	ND	ND	NA	127.7
PCP	ND	ND	ND	ND	NA	ND
Naphthalene	0.0898	0.25	ND	ND	NA	0.296

ND = not detected.
NA = not analyzed.
ug/m^3 = microgram per cubic meter.

[a]In Section 3.4, Fate and Transport Analysis, lagoon areas and existing spray field are grouped together and treated as a common source area.
†No wells installed.

Source: ESE, 1986a.

KOPPERS/GALESBURG DECISION SUMMARY

APPENDIX B -- RESPONSIVENESS SUMMARY

KOPPERS/GALESBURG SITE
RESPONSIVENESS SUMMARY FOR DECISION SUMMARY

Overview

The IEPA recently held a public comment period for the Koppers/Galesburg project from May 22, 1989 through June 12, 1989 for interested parties to comment on the voluntary Remedial Investigation and Feasibility Study (RI/FS) prepared by the Responsible Parties (RPs) and the proposed plan prepared by IEPA, in consultation with USEPA. This public comment period was held in accordance with federal Superfund law (CERCLA Section 117) and applicable Illinois state law. For this project two public hearings were held; the first took place on May 23, 1989 at which primarily site and study background information was presented along with the Agency's preferred alternative; the second was held on June 8, 1989 which focused on the preferred alternative and public comment on the project.

The purpose of this responsiveness summary is to document the Agency's responses to verbal and written questions and comments received during the public comment period. These questions and comments were considered prior to selection of the final remedy for the Koppers/Galesburg site which is documented in the ROD declaration and decision summary. The Community Relations section of IEPA will formalize this responsiveness summary for distribution to parties on the extensive site mailing list in the near future.

Responses to Questions and Comments Received at the Public Hearings

The following questions are paraphrased from verbal comments received at the Koppers/Galesburg public hearing(s).

Question 1:

Were contaminants in the sediment and water of Brush Creek evaluated during the RI?

Response:

Sampling performed by the Responsible Parties (RPs) as part of the original RI in 1985 did not include sediment and water in Brush Creek "off-site". However, supplemental off-site data collected in several phases by IEPA as part of the Steagall Landfill investigation (some of which have been split-sampled by the RPs) has been utilized in the development of the Koppers/Galesburg endangerment assessment (EA), EA addendum and subsequent feasibility study. Further study of Brush Creek and Lake Bracken is anticipated under the Steagall Landfill project in the near future.

Question 2:

During the past winter (1988-89), there appeared to be an unusual build-up of ice in Brush Creek, as well as an incident with discolored surface water in February. Were these conditions due to discharges from the Koppers/Galesburg site?

Response:

Samples of the surface water in February by IEPA contained trace levels of a couple of volatile organic compounds. While the selected remedy for the Koppers/Galesburg site has not been implemented, (and contaminant releases to surface waters existing conditions are possible, although not likely) the observed water contaminants are not characteristic of Koppers' wastes and are probably associated with the Steagall Landfill or another source. As stated in the response to Question 1, further study of Brush Creek is planned.

Question 3:

How does the biological treatment process in the experimental cell function?

Response:

Several background documents on the biological degradation of wood-treating wastes have been developed by the responsible parties and can be reviewed by interested parties at IEPA's central office upon request. Basically, microbes which are present in, and acclimated to, contaminated soils on-site will be optimally managed in a controlled environment within the pilot cell by additions of water, nutrients and oxygen to maximize their population growth and use of contaminants as a "food source". Wastes will be added in consistent ratios and volumes of contaminants to maintain this optimal level of biological activity. For the full scale on-site cell, once treatment of each discrete layer of contaminated soil is complete, (i.e. significant toxicity reductions achieved) a new layer will be added to the cell and the process will be repeated. This cycle will continue over several years until all identified grossly contaminated soils are remediated. Long-term management measures to prohibit access to the cell and erosion of the final vegetative cover will then be implemented.

Question 4:

How will surface water run-off be collected once the preferred (selected) remedy has been constructed?

Response:

It should first be noted that during remedy construction, contaminated surface water and sediment generated during excavation of "hotspots" will be effectively contained on-site and treated/disposed of in a proper manner. Those measures will be implemented while phased excavation, backfilling, regrading and revegetation of each affected area is ongoing, and continue until that surface work is complete and approved. Measures to be taken would most likely include clean water diversion and collection of contaminated water through construction of temporary open ditch systems and properly sized sedimentation ponds. Collected water would most likely be pumped back to the facility wastewater system for pretreatment as necessary, followed by discharge to the POTW for final treatment.

Responses to Written Questions and Comments Received During the Public Comment Period

Three letters were received at the close of the public comment period, two from counsel representing private parties and one from the environmental consulting firm retained by the responsible parties. Those questions and comments are paraphrased here for conciseness of this summary.

Question 5:

An inquiry was made concerning procedures for individuals to file claims with the Agencies for reimbursement of damage to property affected by a contaminated site.

Response:

There are no provisions within CERCLA/SARA or state environmental law for individuals to file claims with the regulatory agencies to recover damages from a Superfund site. However, individuals could pursue damage claims through private legal actions against the responsible parties for a site.

Question 6:

An inquiry was made concerning consideration by the Agency of technical comments on the Koppers/Galesburg RI/FS after the close of the public comment period.

Response:

While remedy selection in the Record of Decision is based on public comment received throughout the development of the study and its formal comment period, the Agency will accept and consider comments in subsequent phases of the project. Such comments would be placed in the masterfile and become part of the site administrative record. Responses to comments received would be made by the Agency as appropriate.

Technical questions and comments received from the RP's on the proposed plan are as follows:

Question 7:

A question was raised on revision of the groundwater restoration computer model.

Response:

The results of the groundwater computer model being revised by an independent consultant to USEPA will be available in July 1989. This model is being refined to account for positive impacts to the existing groundwater pollution problem from both the selected remedy (i.e. source removal and groundwater collection/flushing) and in-place natural biological degradation of residual soil contamination during groundwater remedy implementation.

Comment 8:

A comment was received from the responsible parties concerning Resource Conservation and Recovery Act (RCRA) Applicable or Relevant and Appropriate Requirements (ARARs). They maintain that RCRA is not applicable to the waste areas being addressed or the activities planned under the selected remedy.

Response:

The IEPA and USEPA position on RCRA ARARs is detailed in the decision summary for this site. It is the opinion of the Agencies that RCRA action-specific requirements are relevant to all activities performed pursuant to the selected remedy, and directly applicable to a portion thereof.

Comment 9:

A comment was received from the responsible parties concerning the conceptual approach by the Agency for long-term groundwater monitoring.

Response:

The Agency believes RCRA groundwater monitoring requirements are at least relevant to given site conditions and the selected remedy. At the same time, the CERCLA program advocates tailoring a monitoring program to site-specific characteristics and will be working toward that during Remedial Design/Remedial Action (RD/RA) settlement negotiations with the RPs.

Comment 10:

A comment was received from the responsible parties concerning the significance of a reduction in the final toxicity of wastes in comparison to their initial toxicity in the successful demonstration of the biological treatment technology.

Response:

While final toxicity of treated wastes will be assessed in comparison to initial toxicity, long-term management measures will also be determined by toxicity reductions in relation to the goal of attainment of background toxicity qualities because remedial actions must be protective of human health and the environment. The other focal point of the demonstration study will be to establish the leachability characteristics of waste soils to be treated. Full scale application of this technology must effectively control leachate from the cell so that it doesn't contribute additional contamination of the groundwater.

Question 11:

A question was received from the RPs concerning USEPA Region V's level of acceptance of the preferred alternative (currently the selected remedy).

Response:

The support Agency for a project (in this case USEPA for the Koppers/Galesburg site) provides technical and policy comments on the lead Agency's preferred alternative through the Record of Decision (ROD) process. USEPA, Region V is support've of the preferred alternative (and at this stage, the selected remedy) and will express this position of concurrence in the ROD.

Question 12:

A question was received from the RPs concerning the significance of the identification of additional waste areas to a table in the final proposed plan.

Response: The areas added (interceptor ditch and waste pile) have been previously noted as former waste management areas by the RCRA program and were recounted here for completeness in identifying all areas of potential concern. Discussions on additional RCRA requirements, if any, for these and other areas to satisfy RCRA program concerns through a CERCLA enforcement agreement will take place during forthcoming RD/RA settlement negotiations.

Comment 13:

A comment was received from the responsible parties concerning their position on groundwater chemical-specific ARARs to be met and confirmed prior to certification of the remedy as complete.

Response:

The IEPA's and USEPA's position on chemical-specific "clean-up" objectives for groundwater is documented in detail in the decision summary of the ROD. This position is based on protection of human health and the environment for the conditions present at the Koppers/Galesburg site.

KN:rd/sp2239k/1-5

KOPPERS/GALESBURG DECISION SUMMARY

APPENDIX C -- SITE ADMINISTRATIVE RECORD

ADMINISTRATIVE RECORD
GALESBURG/KOPPERS

Through May 16, 1989

DATE	TITLE	AUTHOR	PAGES
05/29/81	Hydrogeologic Investigation of the Koppers Company Plant	JAQuagliotti - Koppers	88
06/10/83	Draft Remedial Action Master Plan	CH2M Hill - USEPA	94
09/23/83	Remedial Action Master Plan	CH2M Hill - USEPA	97
02/02/83	Memo re: sampling of residential wells	SRao - IDPH	1
01/20/83	Letter re: sampling of residential wells	MAFranck - Koppers	3
11/30/83	Letter re: sampling of plant perimeter wells and results	MAFranck - Koppers	3
12/02/83	Letter re: sampling of plant drinking water well and results	MAFranck - Koppers	5
Dec-83	Total Microbial Detoxification of Pentachlorophenol	JGSteiert, et al. UMinnesota	12
01/18/84	Memo re: acceptable groundwater concentrations of PAH's	Center for Disease Control, HHS	1
Jan-85	Technical Memorandum - Preliminary Evaluation	ESE	41
Jan-85	Project Health and Safety Plan	Environmental Sc. & Engineering (ESE)	31
Mar-85	Geophysical Survey Work Plan	ESE	4
Mar-85	Hydrogeological Work Plan	ESE	14
04/19/85	Draft Review Comments on Sampling Plan	DCrandall - IEPA	2
04/30/85	Memo re: 3/25/85 meeting	DCrandall - IEPA	3
05/01/85	Project Health and Safety Plan	ESE	33
05/02/85	Phase II Work Plan - Immediate Removal	ESE	25
05/02/85	Memo re: draft comments on Phase II Work Plan	DCrandall - IEPA	3

DATE	TITLE	AUTHOR	PAGES
05/03/85	Phase II Project Health and Safety Plan	ESE	33
05/03/85	Technical Memorandum - Preliminary Evaluation	ESE	67
05/10/85	Geophysical Survey Work Plan	ESE	4
05/13/85	RI/FS Work Plan	ESE	40
05/24/85	Letter re: comments on Hydrogeologic Work Plan	DCrandall - IEPA	3
05/28/85	Phase II Air Monitoring Plan	ESE	9
06/03/85	Hydrogeological Work Plan	ESE	17
Jun-85	RI/FS Project Quality Assurance Plan	ESE	104
Jun-85	Draft RI/FS Project Quality Assurance Plan	ESE	105
Jun-85	Second Draft RI/FS Project Quality Assurance Plan	ESE	104
07/01/85	Memo re: soil sampling	DCrandall - IEPA	2
07/09/85	Letter re: QAPP comments	DFavero - USEPA	1
07/11/85	Draft Work Plan for On Site Soil Treatability Study	Env. Research & Technology (ERT)	59
07/24/85	Letter re: comments on Sampling Plan	DCrandall - IEPA	3
07/24/85	Draft RI/FS Statement of Work	IEPA/RPMS	34
07/26/85	RI/FS Sampling Plan	ESE	40
07/29/85	Letter re: comments on Phase II Work Plan and Project Health and Safety Plan	DCrandall - IEPA	6
Jul-85	Work Plan for On Site Soil Treatability Study	ERT	58
Aug-85	The Land Treatability of Creosote/ Pentachlorophenol Wastes	ERT	142
09/13/85	Phase II Air Monitoring Plan	ESE	9

DATE	TITLE	AUTHOR	PAGES
09/18/85	Run-On/Run-Off Control Plan	ESE	9
09/18/85	Contingency Plan	ESE	30
10/08/85	Air Monitoring Data	ESE	48
11/15/85	Land Treatment Evaluation Plan	DKerschner - Koppers	25
11/18/85	Chapters 1-3, Draft RI Report	ESE	143
12/18/85	Technical Memorandum - Air Monitoring Results	SCarter - ESE	18
12/26/85	Letter re: comments of Land Treatment Evaluation Plan	BBradley - USEPA	3
01/08/86	Draft RI Report	ESE	564
01/14/86	Memo re: comments on land treatment lab study	DCrandall - IEPA	3
01/24/86	Plan For Continued Groundwater Monitoring	ESE	7
01/28/86	Letter re: comments on Draft RI Report	BBradley - USEPA	2
02/06/86	FS Work Plan	ESE	9
02/07/86	Letter re: comments on Land Treatment Evaluation Plan	KNeibergall - IEPA	4
02/19/86	Results - Ground Water Flow Model	DKerschner - Koppers	10
02/24/86	Revised RI/FS Schedule	DKirschner - Koppers	2
02/26/86	Letter re: comments on draft RI Report	BBradley - USEPA	5
02/27/86	Memo re: comments on draft RI Report	DCrandall - IEPA	5
02/28/86	Memo re: comments on draft RI Report	RTurpin - IEPA	2
02/28/86	Technical Memorandum - FS Goals	SCarter - ESE	2
03/04/86	Letter re: comments on draft RI Report	KNeibergall - IEPA	3

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DATE	TITLE	AUTHOR	PAGES
03/04/86	Letter re: comments on draft RI Report	HChinn - IAGO	4
03/05/86	Memo re: RI/FS Schedule Revision	KNeibergall - IEPA	2
03/11/86	Letter re: comments on FS Work Plan	KNeibergall	3
03/11/86	Letter re: comments on FS Work Plan	BBradley - USEPA	1
03/11/86	Memo re: Quality Assurance Data Evaluation	SCarter - ESE	2
03/17/86	Memo re: plant well contamination	DBennett - IEPA	1
03/18/86	Letter re: comments on FS Goals	BBradley - USEPA	1
03/24/86	Letter re: comments on FS Goals	KNeibergall - IEPA	
03/26/86	Letter re: response to comments on draft RI Report	SCarter - ESE	5
03/31/86	Plan For Continued Ground Water Monitoring	ESE	7
04/17/86	Letter re: 4/4/86 meeting	SCarter - ESE	4
04/22/86	Memo re: Quality Assurance Data	RTurpin - IEPA	1
04/30/86	Letter re: scheduling of remaining work	DKerschner - Koppers	3
05/13/86	Letter re: RI Report and FS completion	KNeibergall - IEPA	3
05/19/86	Letter and drip track construction drawings	DKershner - Koppers	1
05/21/86	Letter re: comments on draft RI Report	BBradley - USEPA	2
05/22/86	Letter re: comments on draft RI Report	KNeibergall - IEPA	4
06/06/86	Technical Memorandum - Surface Water Monitoring	SCarter - ESE	
06/06/86	Memo re: review of QA/QC Data	RTurpin - IEPA	7
06/09/86	Final RI Report	ESE	
06/11/86	Groundwater Treatability Study Report	DKerschner - Koppers	22

DATE	TITLE	AUTHOR	PAGES
06/12/86	Technical Memorandum - Potential For Migration Into Bedrock Aquifers	SCarter - ESE	21
Jun-87	Bench-Scale EBDS Demonstration	Keystone Environ. Resources, Inc.	
07/03/86	Letter re: comments on Final RI Report	BBradley - USEPA	2
07/09/86	Letter re: groundwater gradient control	DKerschner - Koppers	6
07/15/86	Letter re: response to comments on Final RI Report	SCarter - ESE	3
07/16/86	Technical Memorandum - Asbestos In Ground Water	SCarter - ESE	5
07/25/86	Letter re: comments on addendum to RI Report	KNeibergall - IEPA	4
08/08/86	Addendum No. 1 to RI Report	ESE	
10/29/86	Memo re: request for cleanup objectives review	KNeibergall - IEPA	10
Oct-86	Draft Endangerment Assessment	ESE	
11/18/86	Letter re: comments on draft endangerment assessment	KNeibergall - IEPA	9
12/02/86	Letter re: response to comments on draft endangerment assessment	SCarter - ESE	9
12/15/86	Letter re: comments on final endangerment assessment and incineration info	KNeibergall - IEPA	9
12/17/86	Memo re: comments of draft endangerment assessment	VGupta - IEPA	7
12/14/86	Letter re: applicability of SARA	SCarter - ESE	1
12/30/86	Letter re: use of incineration	JFrank - IEPA	1
Dec-86	Second Draft Endang. Assessment	ESE	
Dec-86	Final Endangerment Assessment	ESE	
02/12/87	Letter re: Brainerd EDD	JLynch - RETEC	39
Feb-87	Draft Feasibility Study	ESE	

DATE	TITLE	AUTHOR	PAGES
Mar-87	Brainerd Annual Monitoring Report	RETEC	
04/01/87	Letter re: comments on Draft FS	KNeibergall - IEPA	10
04/21/87	Letter re: response to comments on Draft FS	DKerschner - Koppers	2
Apr-87	Evaluation of Biodegredation System	Keystone	
05/01/87	Letter re: response to comments on Draft FS	SCarter - ESE	8
06/05/87	Letter re: second comments on Draft RI	KNeibergall - IEPA	11
06/08/87	Letter re: 5/27/87 meeting	SCarter - ESE	4
06/26/87	Letter re: response to comments on Draft FS	DKerschner - Koppers	4
08/03/87	Progress Rpt. - Groundwater Results	ESE	6
08/21/87	Supplemental Report - Ground Water Contaminant Transport Modeling	ESE	14
09/30/87	Letter re: changes to monitoring program	SCarter - ESE	2
Oct-87	Steagall RI Report	Envirodyne Eng.	
01/04/88	Letter re: comments on Draft Remedial Action Plan	DKerschner, TPatno Koppers, Glacier Park	5
01/07/88	Letter re: comments on Draft FS	BBradley - USEPA	8
01/07/88	Memo re: lagoon pit sampling	KNeibergall - IEPA	7
02/08/88	Memo re: PNA cleanup guidance	COT - IEPA	9
04/20/88	Letter re: comments on fish study QA/QC	TPatnode - Glacier Park	4
04/26/88	Memo re: soil cleanup levels	Mathes	21
04/29/88	Letter re: 4/26/88 meeting	KNeibergall - IEPA	3
May-88	Statement of Work - EBDS Pilot Unit	Keystone	22
06/07/88	Memo re: comments on monitoring proposal for treatment pilot	KNeibergall - IEPA	3
Jun-88	Review of Proposed Cleanup Guidance for PAH's	Mathes	13

DATE	TITLE	AUTHOR	PAGES
Jun-88	Work Plan for Aquifer Testing	Mathes	33
Jun-88	Biological Degredation of Wood Treating Chemicals	Keystone	
07/03/86	Letter re: final comments on RI Report	KNeibergall - IEPA	2
Jul-88	Guidelines for Field Imp. of Visual Cleanup Standard	Mathes	19
08/09/88	Solute Transport Modeling of PNA and Phenol in Deep Sandy Aquifer	MDK Consult.	
08/09/88	Addendum to Solute Transport Modeling	MDK Consult.	
08/10/88	Letter re: discharge to POTW	JBrowning - GSD	1
Aug-88	Hydrogeologic Evaluation of Aquifer Testing of the Sand Unit	John Mathes & Assoc.	
09/28/88	Letter re: 9/22/88 meeting	KNeibergall - IEPA	5
10/05/88	Letter re: toxicity testing	THippe - Mathes	2
10/06/88	Letter re: review of ARAR's	KNeibergall - IEPA	3
10/24/88	Letter re: water quality for use in BAT modeling	THippe - Mathes	3
10/31/88	Memo re: prelim. natural resources survey	USDept. of Interior	2
11/10/88	Letter re: surface water discharge limits	KNeibergall - IEPA	4
11/17/88	Letter re: Mathes conflict of interest	RSchutz - BN	1
11/17/88	Letter re: toxicity testing	KChristensen - IEP	5
11/30/88	Letter re: response to Mathes conflict of interest	BHutton - IEPA	1
12/06/88	Memo re: PNA cleanup objectives	JO'Brien - IEPA	3
12/07/88	Letter re: RCRA land ban	GVonStamwitz - Koppers	3
12/20/88	Letter re: 12/07/88 meeting	RSchutz - BN	7

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DATE	TITLE	AUTHOR	PAGES
Dec.-88	IDPH Health Assessment	IDPH	143
12/27/88	Letter Re: RPC Designation	B. Noonan-BN	1
01/05/89	Package Re: RP Financial Statement	R. Schutz-BN	36
01/30/89	Letter-Schedule	K. Neibergall	2
01/31/89	Report-BAT Analysis	Mathes	101
Jan.-89	Report-EA Addendum	ESE	83
02/22/89	Letter Re: 2/8/89 Meeting	R. Schutz-BN	3
Feb.-89	Draft FS Addendum Report	Mathes	102
03/03/89	Letter Re: Biomonitoring	B. Hutton-IEPA	5
03/14/89	Letter Re: FS Comment-Responses	T. Hippe-BN	6
03/28/89	Package Re: FS Addendum Comments	K. Neibergall-IEPA	24
03/29/89	Letter Re: USEPA Air Comments	P. Pearce-USEPA	4
03/30/89	Draft Final FS Report	Mathes	236
03/31/89	Package Re: Draft FS Addendum Comments	K. Neibergall-IEPA	6
04/03/89	Letter Re: Financial Assurance	G. VonStamwitz-BMS	2
04/10/89	Letter Re: Biotreatment Cell	T. Hippe-BN	20
04/26/89	Letter Re: 4/11/89 Meeting	R. Schutz-BN	3
05/01/89	Letter Re: Public Comment Period	T. Hippe-BN	2
05/01/89	Hearing Notice	K. Luly-IEPA	1
05/04/89	Letter Re: BAT Comment-Responses	T. Hippe-BN	5
05/10/89	ATSDR Health Assessment	ATSDR	20
May-89	FS Addendum Report	Mathes-BN	123
05/16/89	Letter Re: Air Data-Wood Treat Sites	RETEC-BN	15
05/18/89	Additional Hearing Notice	K. Luly-IEPA	1
05/19/89	Proposed Plan	K. Neibergall-IEPA	55

DATE	TITLE	AUTHOR	PAGES
06/05/89	Proposed Plan Fact Sheet	K. Luly-IEPA	7
06/06/89	Letter Re: BAT Comments	T. Kluge-IEPA	3
06/09/89	Letter Re: RI/FS Comment	T. Hippe-BN	26
06/09/89	Letter Re: RI/FS Comment	Z. Lucus	2
06/09/89	Letter Re: RI/FS Comment	D. Rosenfeld	1
06/16/89	Draft ROD	K. Neibergall-IEPA	88

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